JANUARY 5, 1959

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

The Changing Role of Metalworking Managers

...PAGE 95

- Managers View '59—The Threshold Year ...PAGE 99
- Metalworking Facts and Figures You Can Use ...PAGE 139
- 285 Experts Predict Technical Progress ...PAGE 189

METALWORKING OUTLOOK—PAGE 87

CONTENTS—PAGE 5

19

METALWORKING YEARBOOK
AND PLANNING GUIDE

B&W's Mr. Tubes helps you engineer for profit

When your application involves steel tubular products, B&W's Mr. Tubes can help you *engineer for profit*—help you reduce costs and make a better product. Here is the reason why you should make him a member of your product-planning team:

Mr. Tubes, your local B&W district salesman—is thoroughly qualified to help you select the *one* tubular product best suited to your fabricating operations and end-use applications. For instance—in the case of a heat exchanger—should the tubing be seamless or welded? Single length or center welded for unusually long length? What about tolerances? Grade of steel? Mechanical properties and heat treatment? Standard or special specifications?

These are but a few of the many factors involved in determining the right tube for a job. Next time you are planning a product in which tubing is used — call in Mr. Tubes. He can be a valuable member of your team. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

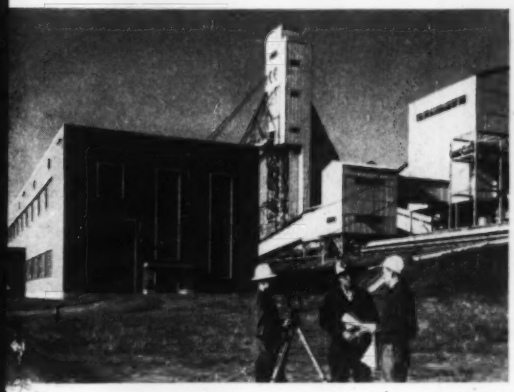
TA-8033-G6

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals.

PROGRESS AT BETHLEHEM STEEL

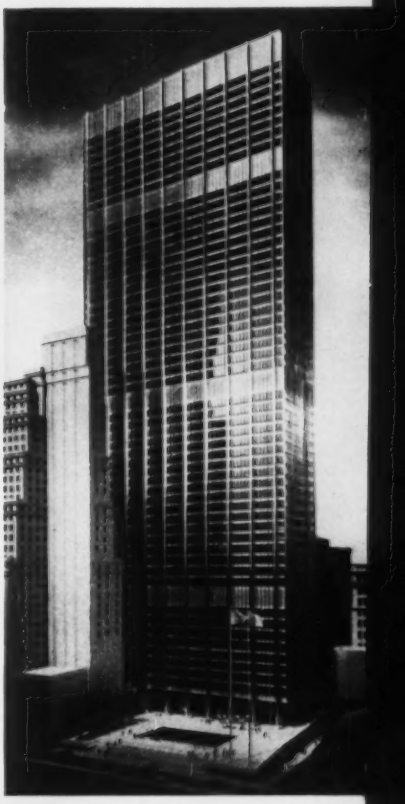
In Steelmaking

Vacuum pouring of ingots is a major advance in the manufacture of sounder, stronger, large-size forgings. In the vacuum-casting method, developed by Bethlehem, ingots as large as 250 tons are poured in a high vacuum, reducing the volume of hydrogen. The result: more strength, longer life for shafts, rotors and other large forgings in critical, highly stressed applications.



In Mining

One of the largest underground iron ore mines brought into production in the eastern United States in the last 50 years is Bethlehem's Grace Mine at Morgantown, Pa. First shipment of iron concentrate was made to a Bethlehem steel plant in November. Grace Mine is an important addition to the nation's domestic ore supply.

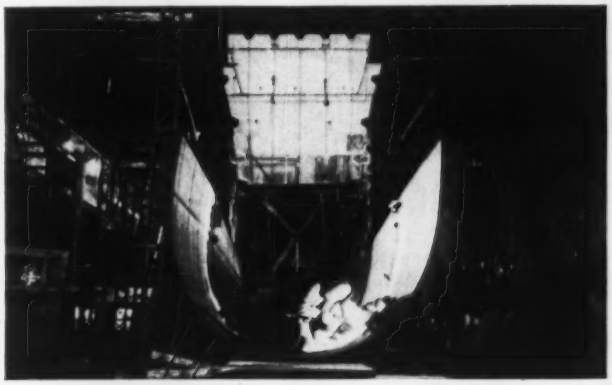


In Construction

Largest office building to be constructed in New York City in the last quarter century is the 60-story Chase Manhattan Bank Building. Deep in the heart of the city's financial district, Bethlehem crews are erecting some 50,000 tons of structural steel for the new bank and office, including six full stories below street level. The joining of structural steelwork is speeded with high-strength bolts. Shown here is a model of the completed structure.

In Safety

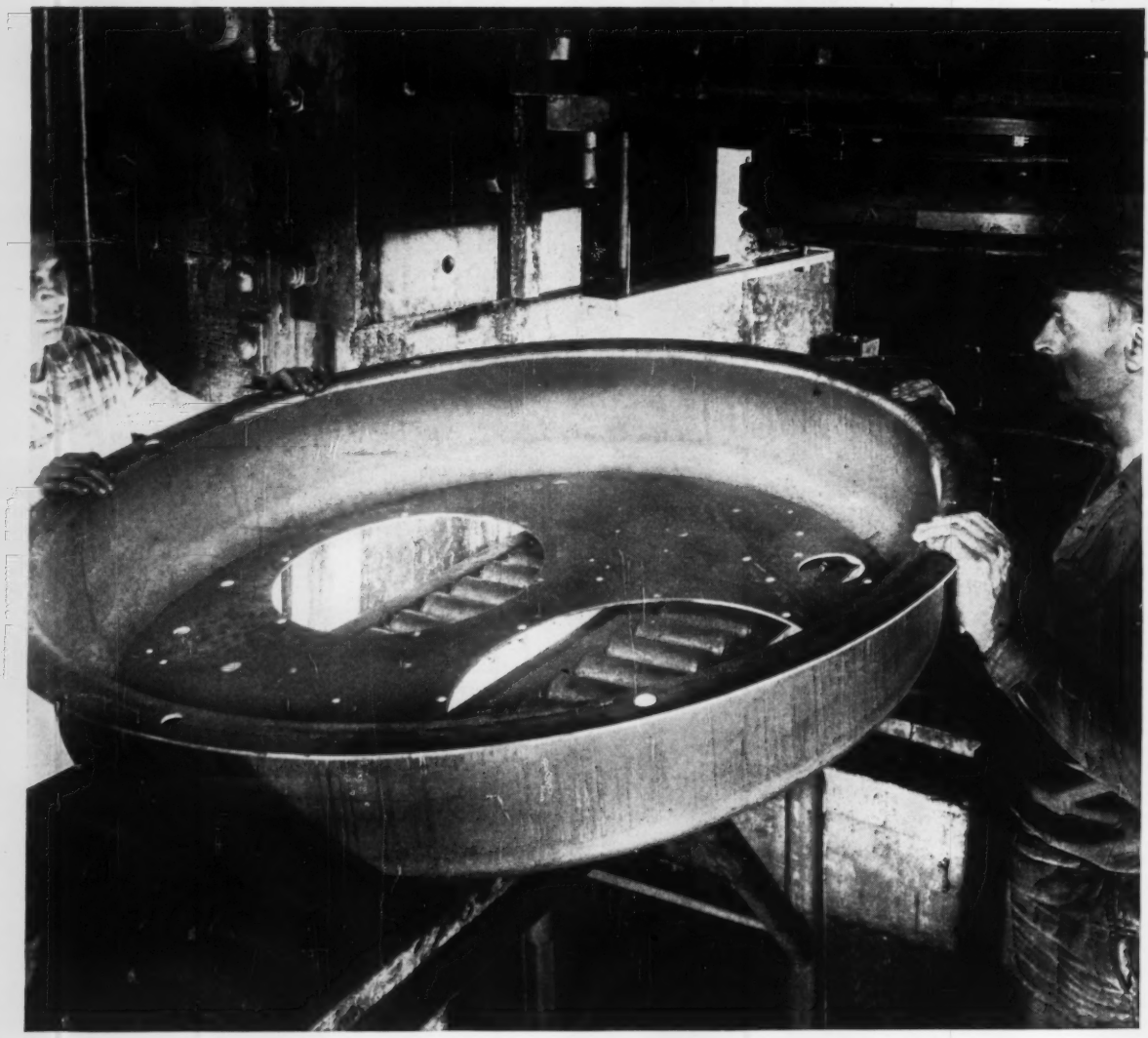
Who's had the safest day? While he's on the job in a Bethlehem steel plant, Dad is actually many times safer than the children at school, or even than Mother at home. Continuing progress in safety is a "must" at all Bethlehem operations—with the result that for the sixteenth consecutive year, a Bethlehem plant has taken first place in the National Safety Council's annual Metals Section contest among the nation's twenty largest steel plants.



In Shipbuilding

First nuclear-powered surface warship. Shown above is the U. S. Navy's cruiser *USS Long Beach*, designed by Bethlehem and building at its Quincy, Mass., shipyard. When completed in 1960, the 14,000-ton cruiser will pack a lethal punch with her ability to launch the Regulus Mark II and other guided missiles. Pioneering in the application of nuclear energy to marine power plants, Bethlehem has also designed and will build a nuclear-powered frigate, to be first of her class.

BETHLEHEM STEEL



Just saved: 61 separate drilling operations

Dimensions and placement of everyone of the 63 holes in this Cleaver Brooks boiler door must be right on the nose. Tolerances of the dished stamping—plus or minus 1/16" on both the 60" diameter and flatness across the flange—must be held even *after* the holes are pierced.

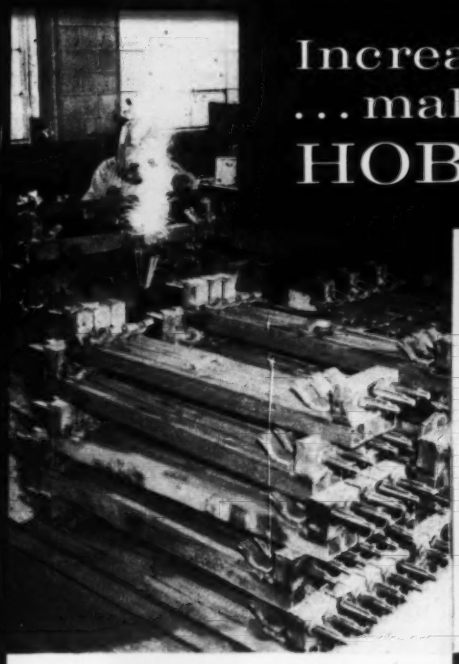
COMMERCIAL meets all of these exacting requirements. It designed and turned out the forming and piercing dies, forms the heavy stampings and gang pierces the holes. And it's the same story all the way with the 36" and 48" diameter dished boiler doors COMMERCIAL also manufactures for Cleaver Brooks.

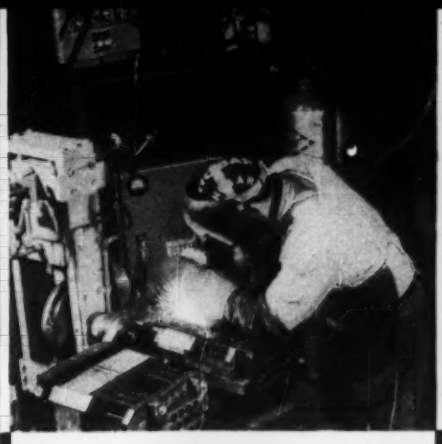
Only the first gang-pierced boiler door requires a tolerance inspection. After that, as in the case of the 60" diameter stamped door, it's 63 holes at one crack—all with identical, near-perfect size and location tolerances every time. And at no time do the actual stampings go beyond the limits of their specified plus or minus 1/16" tolerances.

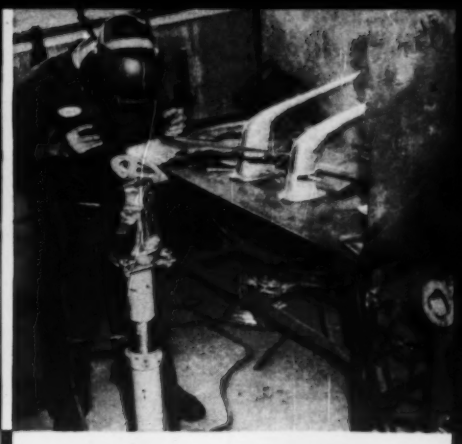
Here's the kind of accurate, cost-saving metal forming service you may want to consider the next time you're in the market for a medium or heavy stamping—long or short run. Just send along a blueprint or complete information on your requirements. Our engineers will cooperate fully. Address Commercial Shearing & Stamping Company, Department L-2, Youngstown 1, Ohio.

COMMERCIAL
SHEARING & STAMPING

Increase your production ... make more profit with HOBART ARC WELDERS







GET FASTER DC WELDING and lower your costs with Hobart Electric Drive Welders

Improvements in welding characteristics and more simplified controls built in the new Hobart Electric Drive DC Welder offer more opportunities for cutting production costs. Save extra money on all types of metal fabrication, maintenance and repair jobs. Let you take advantage of the latest Hobart hi-speed electrodes—a combination that means better quality welding at a bigger savings to you. Compare and test on your own work for proof of more dependable welding operations. Sizes 200 to 600 amp.

Model MB-304-S 300 amp. Stationary

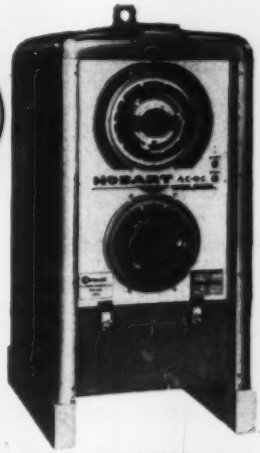
CO_2 WELDING, a new low cost process for radically increasing mild steel production speeds.

Users report production speeds increased to 200" per minute and more! That means big savings to you on your mild steel welding operations. An extra outstanding feature of this new CO_2 welding is the use of a new air-cooled gun that is lighter in weight and easy to use. Eliminates operator fatigue and the need for bulky, troublesome water hoses and connections. It will pay you to investigate this new production tool that guarantees a savings on fabrication costs. May be used stationary or portable as required.

"Powromatic" constant voltage power source

ALLOYS, SPECIAL METALS and mild steel can be welded with this AC-DC Transformer Rectifier Combination.

You actually get three welders in one compact cabinet. Merely shift the convenient selector switch to handle jobs that call for either AC or DC (straight or reverse polarity). You can take full advantage of the latest sizes of all types of electrodes. Jobs become easier, more profitable. Special inert gas facilities and a high frequency stabilizer are built right into the ADI—making it easy to weld Aluminum, Manganese, Titanium, Brass, Copper, and Stainless in light to heavy gauge materials.



Model ADI-364-S AC/DC Inert Gas Combination

HOBART

"Manufacturers of the world's most complete line of arc welding equipment"

Find Your Nearest Dealer in the 'Yellow Pages'

MAIL TODAY for complete information and prices . . . no obligation

HOBART BROS. CO., BOX ST-19, TROY, OHIO, phone FE-21223

Tell me about

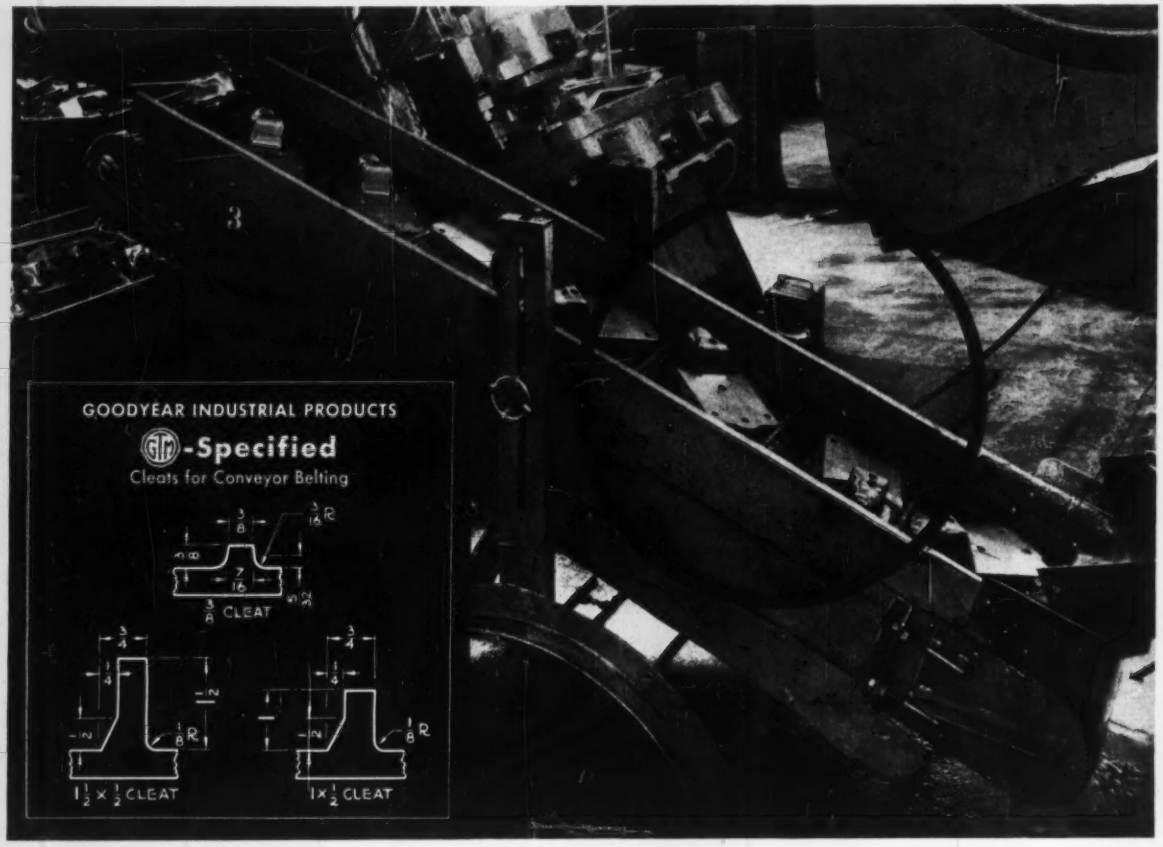
_____ *Amp. Capacity*

- ☐ Electric Drives
- ☐ CO_2 Welding
- ☐ ADI Combination

Name _____

Address _____

City _____ *Zone* _____ *State* _____



They're raising production—and lowering costs by ⅓

Portable conveyors—between production lines on different levels—were a "must" at this Midwestern automotive parts plant. But the specially constructed belts they used soon cut and flaked off. They became oil-soaked and accumulated dust—dirtying the parts. Worse still, they stretched—had to be taken up every 6 weeks. Even then, none lasted more than a year.

Then the G.T.M.—Goodyear Technical Man—recommended Style ORS Cleated Belts. They're made of rubber especially compounded for extreme resistance to oil, cutting and abrasion. And the tough, firm-gripping cleats are molded right into the rubber for durability.

The savings are impressive: The G.T.M.'s less-expensive belts eliminated the need for parts washing. And after 3 straight years of full service—*three times the life of competitive belts*—they're still going strong.

Like to have savings like these on your production lines? The fastest way to find out is to call the G.T.M. He'll be Johnny-on-the-spot if you contact your Goodyear Distributor—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

CONVEYOR BELTING BY

GOODYEAR

THE GREATEST NAME IN RUBBER

This Week in STEEL The Metalworking Weekly

January 5, 1959
Vol. 144 No. 1

EDITORIAL 93

This is a good time to take a look at some of the problems that have a bearing on business profits.

SPECIAL FEATURE 95

The Changing Role of Metalworking Managers

Here is an article that will give you something to think about as metalworking enters a new year.

It is important to you as a manager because your role is changing as all America is changing. Of the many ways your job and responsibilities have shifted over the years, six stand out:

- You're a professional.
- You're a communicator.
- You seek new knowledge.
- You have wider knowledge.
- You're a pioneer.
- You're on guard.

Other special features in STEEL's Metalworking Yearbook issue include results of a survey of plant managers on what to expect in 1959; the Washington and Detroit outlooks; a 48-page Facts & Figures section; a forum on technical progress covering 15 categories; and a chronology of 1958.

WHERE TO FIND—

Behind the Scenes 6
Letters to the Editors 10
Editorial & Business Staffs ... 16
Men of Industry 129
Calendar of Meetings 401
New Products 427
New Literature 436
Advertising Index 467

Business— METALWORKING OUTLOOK 87

The Changing Role of Metalworking's Managers 95
Since 1939, the economy has changed as much as the powerplant in your car. Your role as a manager is to keep the improved economic machine in tune.
Metalworking Managers Expect 9.2 Per Cent More Sales in '59 .. 99
The second half of the year will be better than the first, say the majority of plant managers surveyed by STEEL.

Windows of Washington—

'59: Countdown Year for the Dems Aiming at '60 Election 108
What To Expect from Congress This Year
Business and the 86th Congress: Six Major Issues

Mirrors of Motordom—

1959: Autodom's Make-Ready Year 119

Facts & Figures—

For your use as a reference throughout '59 .....Opposite 138

Forum on Technical Progress— HIGHLIGHTS 190

Steelmaking—Authorities enthusiastic about new methods 192
Nonferrous Metal Production—1959 seen as a good year 216
Casting—Higher mechanical properties development goal 234
Materials and Metallurgy—Focus on Space Age materials 242
Heat Treating—Units designed for higher temperatures 262
Inspection and Testing—New devices will speed job 278
Drives and Controls—Automatic operation still heads list 285
Machining—Greater versatility is the aim here 294
Tooling and Gaging—Watch for tape control in gaging area ... 329
Forming—Explosive methods dominate news in this field 340
Cleaning and Finishing—Look for further integration 354
Joining and Assembly—Ultrasonic welding is coming of age ... 362
Handling and Packaging—More use of power tools forecast ... 374
Lubrication—Accent is on lubricants for brittle metals 383
Service and Maintenance—Cathodic protection will gain 391

Chronology—

What Happened in 1958: Recession Year 413

Markets— MARKET OUTLOOK 439

Complete Index to Market News and Prices 439
Buyers To Build Component Stocks—Quarterly survey 441
Steelworks Operation Chart and District Ingot Rates 446
Scrap Market To Become More Active 459
Nonferrous Metals—Prospects Bright for '59 462

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $20 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday and copyright 1959 by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Index available semiannually. STEEL is also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

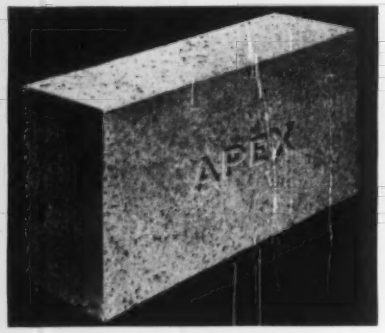
Profit from the Higher Bulk Density of . . .

WALSH

APEX

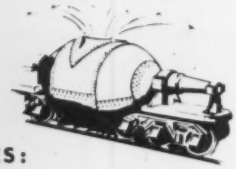
SUPER DUTY FIRE BRICK

Weigh in EXCESS of 150 lbs. per Cubic Foot



Apex, Super Duty Fire Brick Gives You More Fire Clay In Its Densest, Most Compact Form To Increase:

1. Resistance to wear
2. Heat storage and heat flow
3. Hot load bearing strength
4. Resistance to slag penetration



USES:

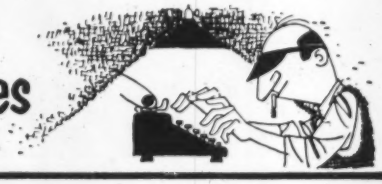
For record tonnage in Closed Hot Metal Torpedo Type Ladles, Hot Metal Mixers, and for maximum service and heat exchange in Hot Blast Stove Checkers and Open Hearth Checkers.

WALSH REFRACTORIES CORPORATION

101 FERRY ST. • ST. LOUIS 7, MO.

FOR OVER 60 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES

behind the scenes



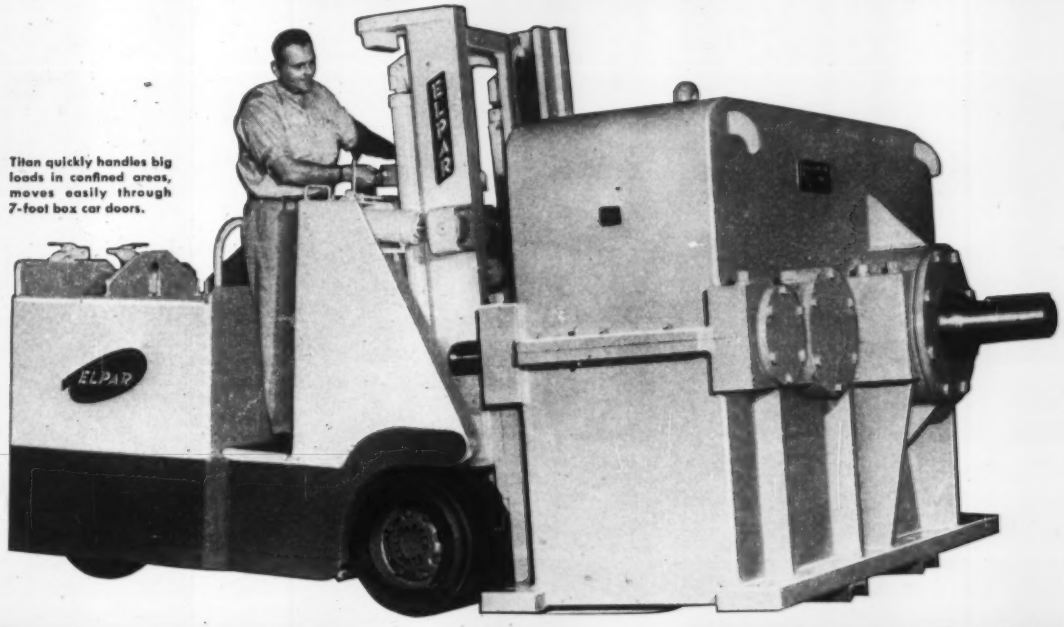
Wherein Mr. Shrdlu Orbits 8 to the Bar

Observe, good friends, this mighty tome
From which you'll be inclined to comb
A wealth of facts, and figures, too,
As joyously you hurry through!
The information printed here
Is cogent, potent, and sincere—
But then, it simply MUST be, when
It's aimed at metalworking men.
The cover with its neat design
(Including nineteen fifty nine
Spread south to north, to say the least,
Instead of reading west to east)
Points out the things you ought to read
If lack of time your course impedes.
A story that will eftsoon goad
Executives who erst abode
In settled, tacit, firm belief
Their roles were changeless—well, in brief
This story gently spills the beans
About executive routines;
You see, through twenty years, and wars,
Big changes swept this gifted corps.
The expectations subsequent
Of metalworking management
Concerning business hopes and fears
Are out of—shall we say?—this sphere.
You'll like their cheerful estimate
That 'fifty nine beats 'fifty eight.
(We hope these cats are right-ho, Fred,
'Cause if they ain't, us ducks are dead!)
Your deep attention won't be lost
On items such as price and cost,
Or how to quickly fabricate,
Not by methods antiquate,
But by the aid of modern tricks
Evolved through business politics—
Through research labs, and boardrooms, too,
Where progress is the thing they woo.
No wonder that we recommend
This tome on which the world depends
The metalworking world, we mean—
But mercy, let's not stand between
The reader and this mighty book
For fear he'll label us a schnook;
So on behalf of STEEL *we'll rear*
And wish you all a Glad New Year.

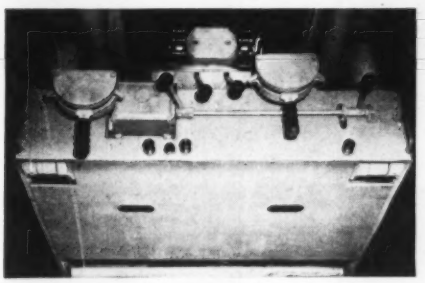
Shrdlu

(Metalworking Outlook—Page 87)

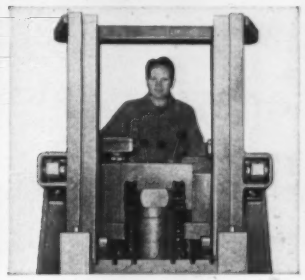
NEW ELPAR® TITAN



Titan quickly handles big loads in confined areas, moves easily through 7-foot box car doors.



Dual controls.



"Picture window" vision.

Easy access to batteries, rugged uprights.

From Every Angle... Unmatched for Heavy Load Handling

In 15,000 to 20,000-pound capacities, the *all-new* ELPAR Titan fork and ram truck series promises *all-around* handling efficiency:

For your production department, exceptional compactness, high travel and lift speeds, freight car maneuverability.

For your operator, clear visibility in every direction, dual controls, power steering.

For your safety department, ELPAR's new "Tri-Safe" braking system . . . three independent brakes — dynamic, hydraulic, mechanical — *act in sequence* and are controlled by a single toe bar.

For maintenance, quick battery change, trouble-free upright design, traditional ELPAR electric truck dependability.

ELPAR®
ELECTRIC TRUCKS

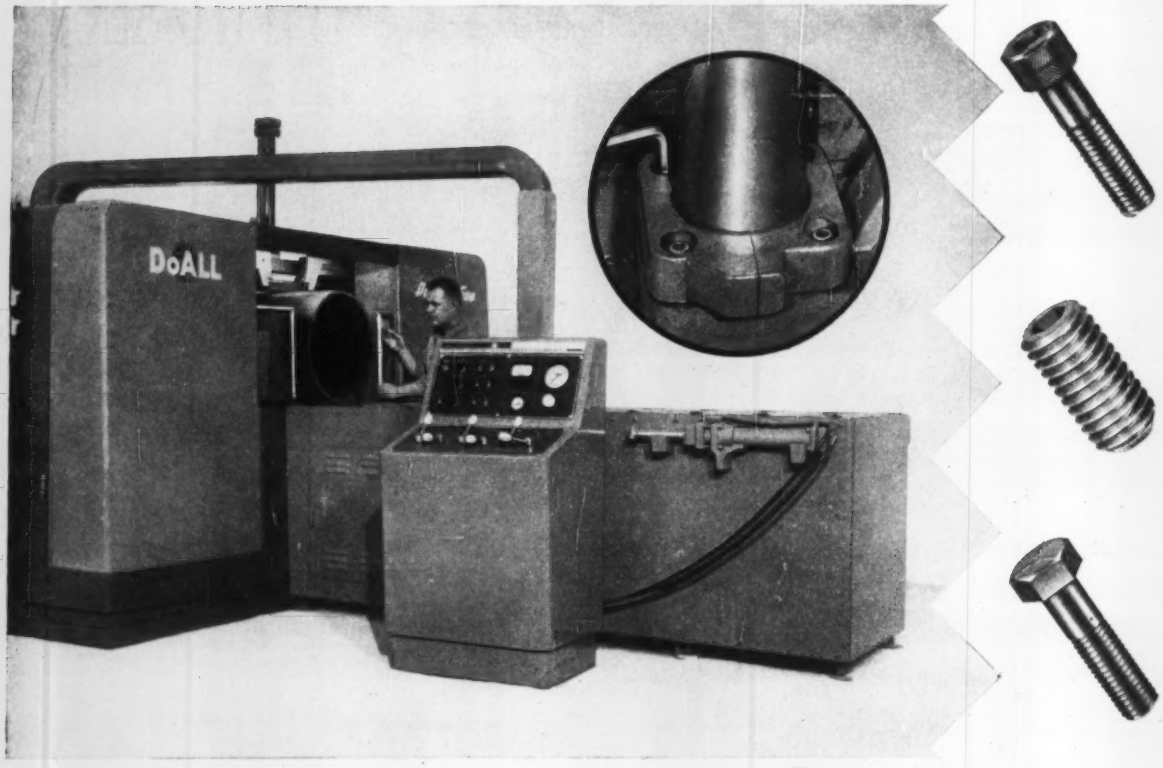
Get the Full Story... SEND FOR TITAN SERIES BULLETIN and "TRI-SAFE" BRAKING BULLETIN

THE ELWELL-PARKER ELECTRIC COMPANY

4101 St. Clair Avenue • Cleveland 3, Ohio

Twice the Life... 1/3rd the Operating Costs

IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew fasteners meet DoALL standards for high strength, rigidity, "clean" design

This outstanding machine was developed by the DoALL Company to handle industry's largest, toughest cut-off jobs. Not a beefed-up model of existing machines, this "biggest band saw built" is a unique new design. As one example, the cutting head travels vertically, but cutting takes place on the lower edge of the top saw band.

The new design of this unit, Model C24, therefore represents an entirely new concept of rigidity, applied power, and precision control. These basic considerations dictated the selection and application of every part . . . including, of course, the fasteners.

Small wonder, then, that DoALL's design engineers, after consultation with Stanscrew's fastener specialist, selected Stanscrew socket cap screws for vital applications such as attaching hydraulic cylinders. These reliable fasteners provide the high strength needed. Correctly applied, they give assurance against misalignment even after extensive use—a must in this precision machine. And, by permitting flush, snag-free surfaces, the fasteners also contribute to the C24's superior styling.

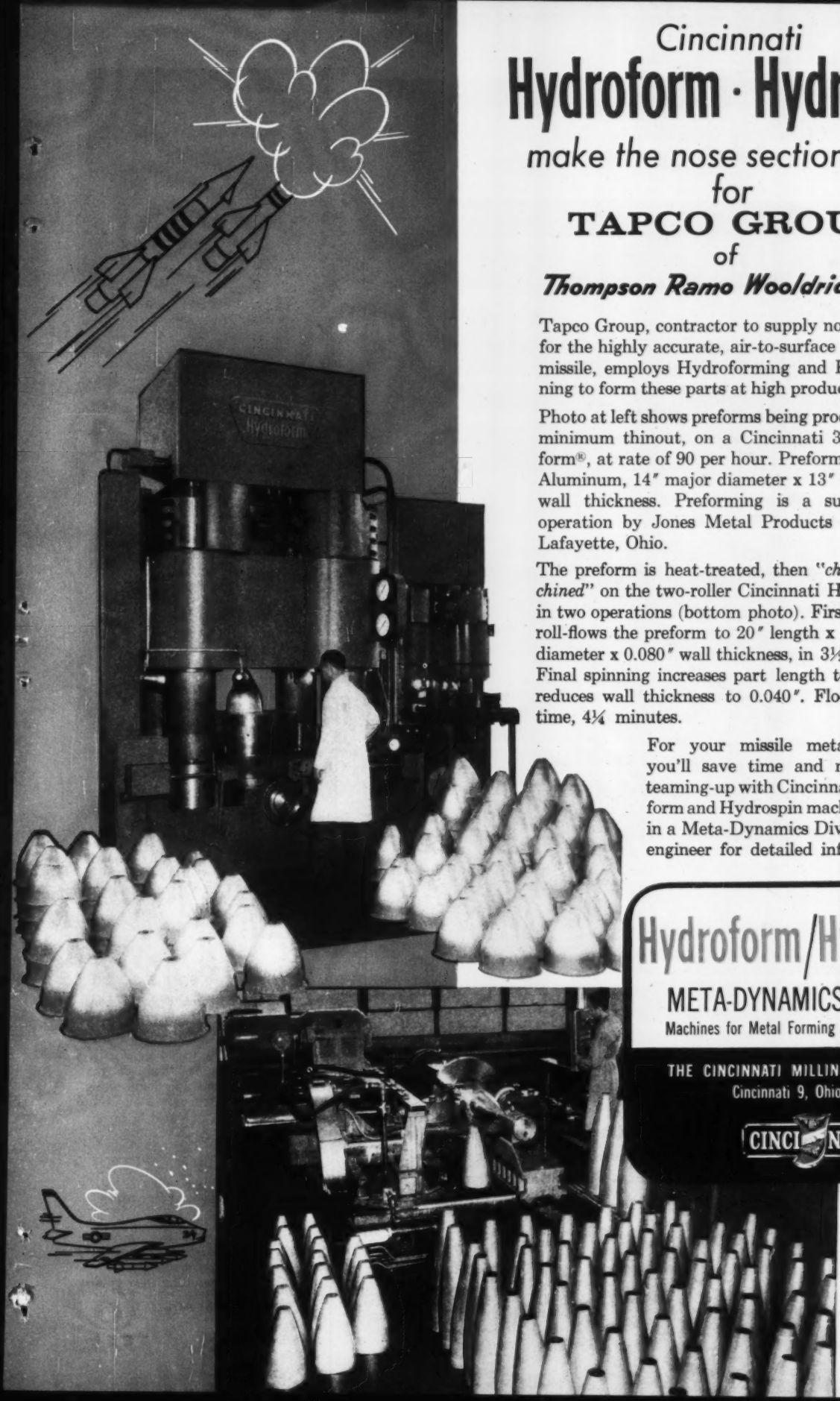
Like DoALL, other leaders of American industry are learning the advantages of calling in a Stanscrew specialist when a new product is on the drawing boards. His wide experience can often suggest ways to cut fastener or assembly costs . . . for example, by substituting a standard fastener for a costly special. He can make suggestions from Stanscrew's complete line of over 4,000 types and sizes, always in stock and quickly available.

So whatever your requirements in fasteners, call your Stanscrew distributor today. He will gladly arrange for a prompt visit from the Stanscrew fastener specialist.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois



Cincinnati

Hydroform · Hydrospin

make the nose sections flow
for
TAPCO GROUP
of
Thompson Ramo Wooldridge Inc.

Tapco Group, contractor to supply nose sections for the highly accurate, air-to-surface "Bullpup" missile, employs Hydroforming and Hydrospinning to form these parts at high production rates.

Photo at left shows preforms being produced with minimum thinout, on a Cincinnati 32″ Hydroform®, at rate of 90 per hour. Preform is of 6061 Aluminum, 14″ major diameter x 13″ deep x ⅛″ wall thickness. Preforming is a sub-contract operation by Jones Metal Products Co., West Lafayette, Ohio.

The preform is heat-treated, then "*chipless machined*" on the two-roller Cincinnati Hydrospin® in two operations (bottom photo). First spinning roll-flows the preform to 20″ length x 12″ major diameter x 0.080″ wall thickness, in 3½ minutes. Final spinning increases part length to 40″ and reduces wall thickness to 0.040″. Floor-to-floor time, 4¼ minutes.

For your missile metalworking, you'll save time and money by teaming-up with Cincinnati Hydroform and Hydrospin machines. Call in a Meta-Dynamics Division field engineer for detailed information.

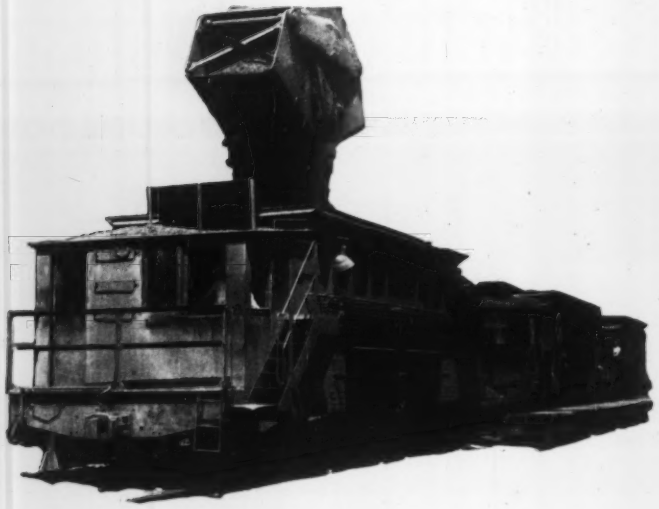
Hydroform/Hydrospin

META-DYNAMICS DIVISION

Machines for Metal Forming and Heat Treating

THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio, U.S.A.

CINCINNATI



day in – day out
DEPENDABILITY

ATLAS

Atlas cars like the 75-ton ore transfers above are built to the individual load and schedule of each user. This custom engineering method, with matching care in manufacturing, assures dependable service incorporating all approved personnel safety features.

Since 1896 designers and builders of Ore Transfers . . . Scale Cars . . . Coke Quenchers . . . Coal Larries . . . Door Machines . . . Safety-Type Transfers . . . Storage Battery Locomotives

ATLAS CAR & MFG. COMPANY
1140 IVANHOE ROAD
CLEVELAND 10, OHIO

LETTERS
TO THE EDITORS

Praises Renegotiation Series

We read the series of renegotiation articles (Nov. 24, p. 62; Dec. 1, p. 42; Dec. 8, p. 64) with interest.

It is the consensus that STEEL's presentation of this vexing problem is the most informative and comprehensive yet written. Congratulations!

Joe Rogers
National Security Industrial Association
Washington

1959: No Pushover

We think your editorial, "1959: No Pushover" (Dec. 8, p. 61), is extremely good, and we would like permission to reproduce it for mailing to our salesmen and customers.

C. E. Drake
President
Drake Corp.
St. Louis

• *Permission granted.*

Good Fortune

Recently I had the good fortune to hear of "To Boost Productivity Consult Your Employees" (Sept. 29, p. 65). Will you send me five copies?

M. L. Moore
Industrial Relations Dept.
National Lead Co.
New York

Reader Looks Forward to STEEL

May we have a copy of "Construction Tool Slashes Furnace Maintenance Costs" (Dec. 8, p. 116)?

We look forward to each issue of your fine magazine and always find something in it of real interest to us.

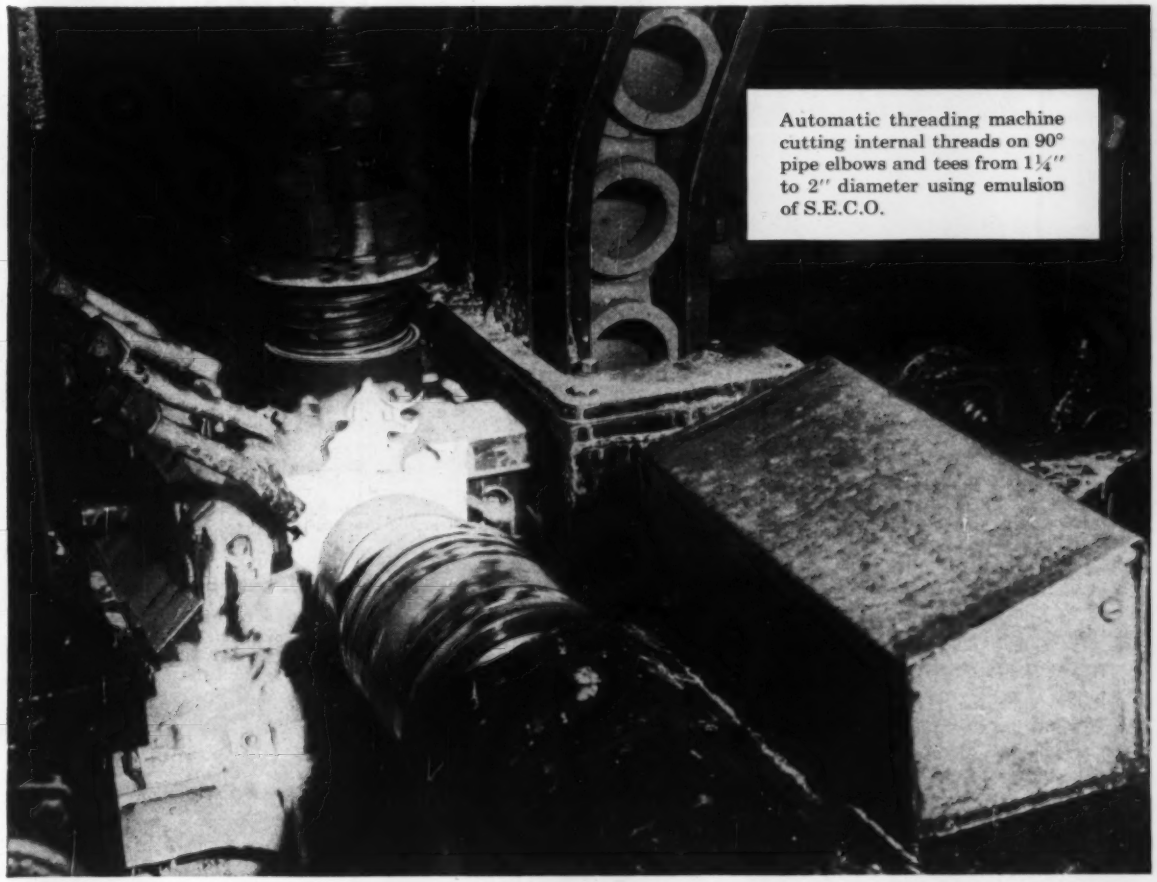
Donald L. French
Structural Metals Inc.
Seguin, Tex.

Corrosion: A Constant Problem

We are interested in obtaining the source from which one of the Technical Outlook items, "Films Indicate Corrosion" (Nov. 10, p. 117), was written.

Corrosion with its resulting wear is our

(Please turn to Page 12)



Automatic threading machine cutting internal threads on 90° pipe elbows and tees from 1¼" to 2" diameter using emulsion of S.E.C.O.

Photo courtesy of Grinnell Corporation

NEW S.E.C.O. EMULSIONS, WITH SMALLER OIL-PARTICLE SIZE, CUT PRODUCTION COSTS

There's a new and greatly improved S.E.C.O. (Sunoco® Emulsifying Cutting Oil), that has smaller emulsion-particle size to give you the following benefits:

- BETTER PROTECTION AGAINST RUST, even at emulsion ratios as lean as 40-to-1.
- BETTER DETERGENCY, which permits dirt and fines to settle quickly out of emulsions, leaving machines clean.
- BETTER EMULSION STABILITY. Even in hard-water areas, emulsions of *new* S.E.C.O. stand up better than those made with other regular emulsifying cutting oils.
- BETTER FINISHES, CLOSER TOLERANCES. New S.E.C.O., with better coverage and wetting of work, produces consistently finer finishes in machining. Reject rate falls off. Tool life increases.

TRY *NEW* S.E.C.O.—for increased economy in all machining operations. Ask your Sun representative, or write to Department S-1.

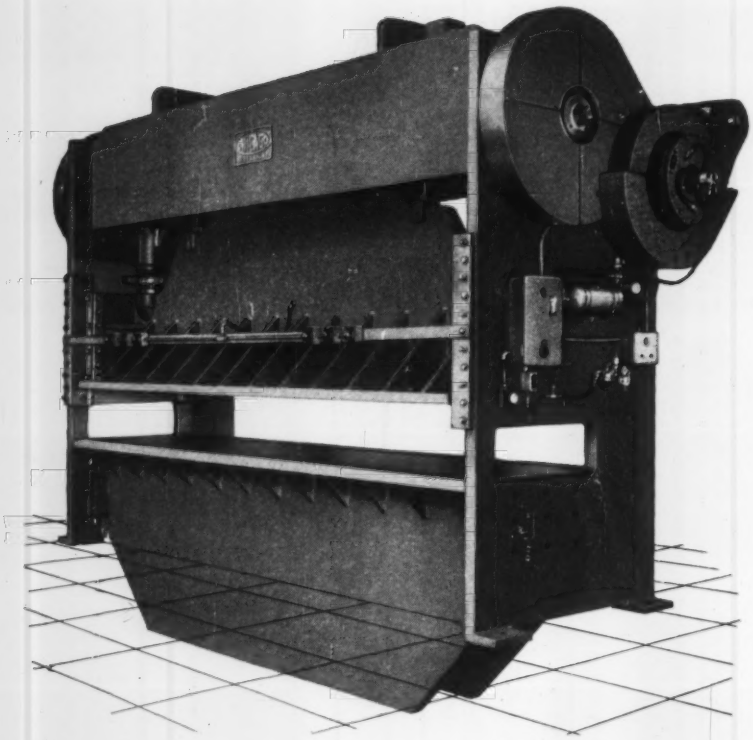
Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.

SUNOCO

© 1958 SUN OIL COMPANY

In Canada: Sun Oil Company Limited, Toronto and Montreal



CHICAGO DREIS & KRUMP

PRESSES
STRAIGHT-SIDE TYPE

large die area
capacities up to 400 tons

This is a typical model of CHICAGO straight-side-type presses used for multiple punching, notching, and trimming operations. This press with a die area of 48 inches by 198 inches has a capacity of 200 tons.

Complete recommendations for any job on request.

8674

CHICAGO DREIS & KRUMP

Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

DREIS & KRUMP
MANUFACTURING CO.
7458 South Loomis Boulevard, Chicago 36, Illinois

LETTERS

(Concluded from Page 10)

greatest difficulty, and we are constantly seeking new ideas and approaches to the problem.

Congratulations on a useful and informative publication.

E. A. Burkhardt

Link-Belt Co.
Indianapolis

• *Send $2.25 for PB 131894 to Office of Technical Services, Department of Commerce, Washington 25, D. C.*

Enjoys STEEL's Facts

May we have two additional copies of STEEL each week? I certainly enjoy the magazine and its pertinent facts about the steel industry.

Dennis J. Scherrer

Star Pump & Cooler Corp.
St. Louis

Wrong Photo but Good Process

The machine you pictured in "Cold Extrusion Saves Metal" (Nov. 17, p. 112) was not a press as stated in the caption, but a Conomatic lathe.

We are quite interested in this process and would like more information regarding it.

W. E. Pierson

Manager of Purchases
Caterpillar Tractor Co. Ltd.
Glasgow, Scotland

• *We regret the inaccuracy. For information we suggest you write the manufacturer of the press, Danly Machine Specialties Inc., 2107 S. Laramie Ave., Chicago 50, Ill.*

Sympathy for Sheldon Schmaltz

I read with interest "The Revolt of Sheldon Schmaltz" (Nov. 24, p. 68).

After putting on trade shows for 31 years, I am sure that others feel the same way as Sheldon Schmaltz. May I have an extra copy of the article?

L. J. Lieberman

Product Manager
Algrip Sales
Alan Wood Steel Co.
Conshohocken, Pa.

• • •

We would like to send this worthwhile article to our representative in the field. Will you send us 75 reprints?

Harold S. Mercier

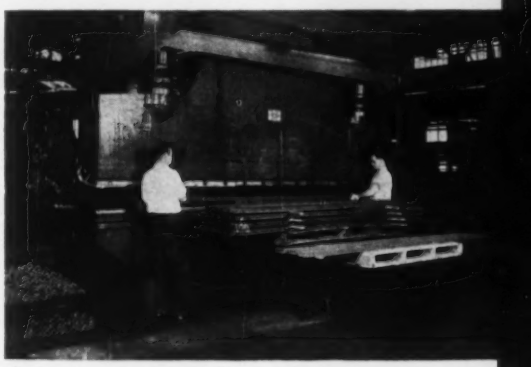
General Sales Manager
Tool Steel Gear & Pinion Co.
Cincinnati

Shows Interest in Opportunity

We have read "Wanted: A Revolution in Manufacturing" (Nov. 24, p. 100) with interest. May we have a reprint?

W. H. Hain

Foundry Sales Administrator
Metals Processing Div.
Curtiss-Wright Corp.
Buffalo



These workmen are using Youngstown Yoloy "E" high-strength steel to fabricate belt rails—a component of DF Loaders—at Evans Products Co.

Accent on Excellence

Youngstown Yoloy "E" high-strength steel

Two DF* Loader-equipped railroad cars easily do the work of three standard box cars. That's because DF cars (31,000 now in service) can be loaded to capacity—earn greater revenue for railroads.

Portions of Evans DF Loaders are fabricated from Youngstown's Yoloy "E" Angles and Hot-Rolled Yoloy Sheets by Evans Products Company, Plymouth, Michigan. All Yoloy Steels are produced to meet a wide range of applications, where high strength and corrosion-resistance are of prime importance.

Wherever high strength steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence".

**DF is a trademark of Evans Products Company.*

EVANS DF LOADER . . . *Locks in lading, eliminates damage and dunnage*

Send for free technical bulletin on Youngstown Yoloy "E" Steel.

QUALITY YOUNGSTOWN SERVICE

THE **YOUNGSTOWN**
SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel, Youngstown, Ohio

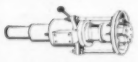
LANROLL attachment

exclusive features

The LANROLL Attachments offer certain features of design that ensure greater accuracy, flexibility and economy not generally found in Thread Rolling Tools. The LANROLL Attachment (capable of producing straight or taper threads) is primarily for application to bar automatics, but may be applied very successfully to the cross slide of a lathe with power feed. Five sizes of the Attachment thread all diameters from #5 to 1¾" (1/16" to 1¼" pipe). For additional detailed information, please request Bulletin G-96.

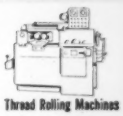
Threading Machines

Die Heads—Rotary & Stationary


Taps—Collapsible & Solid Adjustable

Centerless Thread Grinding Machines

Thread Rolling Tools


Thread Rolling Machines

514C

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

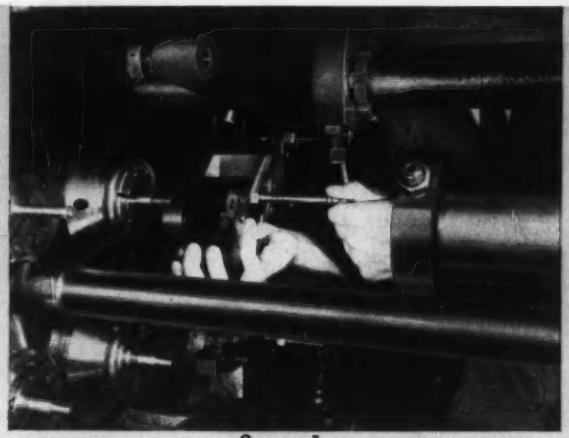


figure 1

1. **Disengaging the attachment from the shank for servicing and tooling changes without disturbing the original set-up** is made possible by the simplicity of design. The shank maintains attachment set-up position and remains clamped on the tool slide. Removal of the attachment from the shank simply requires that a single retaining screw be released and the shank pin withdrawn. (Figures 1 & 2).

2. **Tipping avoids indexing interference** on bar automatics having a limited tool slide movement. When necessary, the basic design permits the attachment to radially pivot away from the rolling area on completion of the thread (Figure 2). This also permits: an attachment of heavier construction, minimizing deflections and assuring exact sizing; larger roll diameters for greater rolling efficiency; and more rugged spindles.

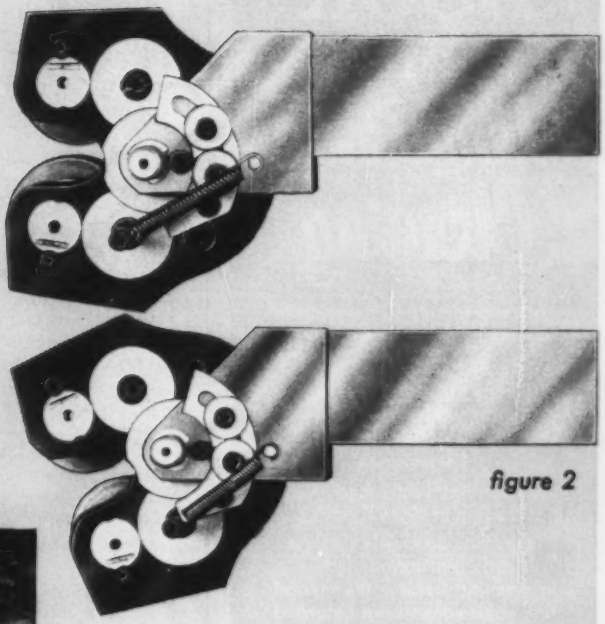
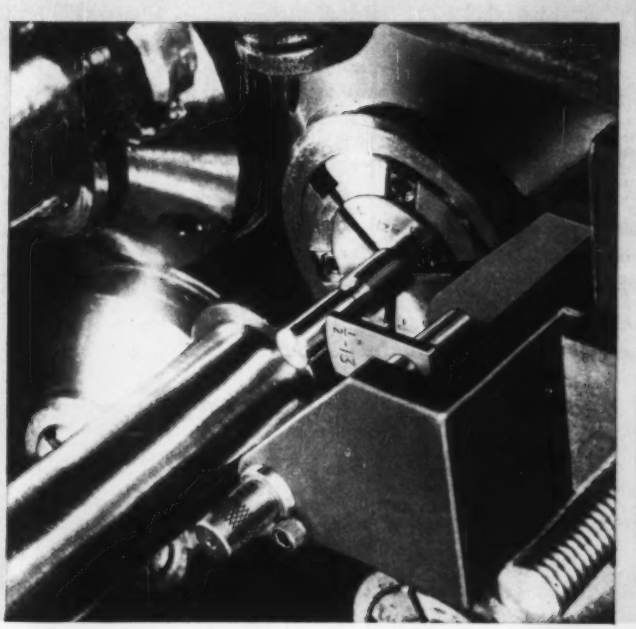
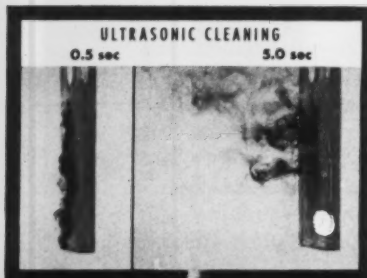


figure 2



3. **A Gage quickly determines the precise position where the vertical centerlines of both the rolls and workpiece coincide.** After the attachment has been positioned horizontally in relation to the prepared workblank, the setting gage is slipped over the shank pin. The high point of the machine's feed cam is established, and the tool slide is advanced until the gage abutts with the O.D. of the workblank (Figure 3).

figure 3



FREE 24-page BOOK on Ultrasonic Cleaning

packed with up-to-the-minute information on

Systems Design
Equipment
Materials Handling
Chemicals
Techniques

for fast, thorough, economical cleaning in every industry.

Learn how to create and use *cavitation* in cleaning fluids — the myriad tiny implosions shown enlarged in the background of this ad. Learn how cavitation literally blasts soils loose in seconds, making critical parts microscopically clean.

BRANSON ULTRASONIC CORPORATION
STAMFORD • CONNECTICUT

To: **BRANSON ULTRASONIC CORP.**
36 Brown House Rd., Stamford, Conn.
Mail your new 24-page book on Ultrasonic Cleaning to:

*Name*_____
*Dept.*_____ *Title*_____
*Firm*_____
*Address*_____
_____
*I want to clean*_____
Sales Engnr. to call? Yes ☐ No ☐

STEEL The Metalworking Weekly

Editor-in-Chief, IRWIN H. SUCH

Editor, WALTER J. CAMPBELL

Associate Managing Editors, VANCE BELL, JOHN S. MORGAN

WILLIAM M. ROONEY .....Market Editor
ROBERT F. HUBER .....Machine Tool Editor
HARRY CHANDLER .....Copy Editor
GLENN W. DIETRICH....Associate Copy Editor
FRANK R. BRIGGS .....Associate Editor
ROBERT O. JAYNES .....Associate Editor
ROBERT M. LOVE .....Associate Editor
AUSTIN E. BRANT .....Associate Editor
ROSS WHITEHEAD .....Associate Editor
GEORGE J. HOWICK .....Assistant Editor
DERRY EYNON .....Assistant Editor
NEIL C. ROBERTS .....Assistant Editor
DONALD E. HAMMERSTROM..Assistant Editor
JOHN TERESKO .....Assistant Editor
MARY T. BORGERHOFF .....Assistant Editor
MARY ALICE EARLY .....Assistant Editor
EILEEN CORTES .....Assistant Editor
MARY ANN STUVE .....Editorial Assistant

JANE WEDGE, Editorial Assistant

THOMAS H. BRYAN, TOM WELSH, Art Editors

IRENE KASNER, Editorial Service

Resident Editors

New York 17 .....60 E. 42nd St.
B. K. PRICE, L. E. BROWNE
BRIAN WILSON, H. GLENN CANARY
Murray Hill 2-2581

Chicago 11 .....520 N. Michigan Ave.
ERLE F. ROSS, WILLIAM E. DEAN
Whitehall 4-1234

Pittsburgh 19 .....2837 Koppers Bldg.
WILLIAM V. WALLACE—Atlantic 1-3211

Detroit 35 .....15800 W. McNichols Rd.
A. DONALD POSTMA—Broadway 3-8150

Washington 4 ....1123 National Press Bldg.
JOHN R. BOTZUM—Executive 3-6849

Editorial Correspondents

Buffalo—Emerson 5385 ....GEORGE E. TOLES
Youngstown—Riverside 7-1471..GEO. R. REISS
Cincinnati—Beechmont 1-9607...DICK HAVLIN
Birmingham—Birmingham 3-1121 R. W. KINCEY
St. Louis—Garfield 1-1212. HAMILTON THORNTON
Houston—Hudson 6-5236 .....ROBERT SHIRK
Los Angeles—Webster 5-1234..NORMAN LYNN
San Francisco—Yukon 6-5151 EDWIN HAVERTY
Seattle—Melrose 2-1895 .....R. C. HILL
Toronto, Canada—Empire 4-9655..F. S. TOBIN
Birmingham, England .....J. A. HORTON
Paris, France .....LEON JAUDOIN-PROM
Brussels, Belgium .....PAUL DE KEYSER
Dusseldorf, Germany ....DR. HERBERT GROSS

BUSINESS STAFF

Business Manager, D. C. KIEFER

Asst. Business Mgr.....C. A. TALLINGER JR.
Advertising Service Mgr. ...DORIS MITCHELL
Production Manager .....A. V. ANDERSON
Classified Advertising .....EVELYN DIETZ
Promotion Director .....S. F. MARINO
Market Research Mgr. ....T. M. BALLANTINE
Circulation Director .....J. C. GERNHARD
Distribution Manager .....G. R. EBERSOLE

Reprints, JUNE SCHILENS

Advertising Representatives

New York 17 .....60 E. 42nd St.
K. A. ZOLLNER, GUY LABAW
Murray Hill 2-2581

Wynnewood, Pa. (Phila.) 200 Wynnewood Ave.
WM. J. VERSCHOOR—Midway 2-6512

Farmington, Conn. .....12 Farmstead Lane
CALVIN FISHER JR.
Orchard 7-1756

E. Rochester, N. Y. .....217 Ridgeview Dr.
HAROLD A. DENNIS—Ludlow 6-6988

Pittsburgh 19 .....2837 Koppers Bldg.
J. C. SULLIVAN—Atlantic 1-3211

Cleveland 13 .....Penton Bldg.
J. K. GILLAM, N. W. MANNING—Main 1-8260

Cincinnati 6 .....2215 Victory Parkway
E. L. FRANKE—Parkway 1-0711

Detroit 35 .....15800 W. McNichols Rd.
C. A. TALLINGER JR., D. C. HYDE
Broadway 3-8150

Chicago 11 .....520 N. Michigan Ave.
L. C. PELOTT, W. L. POLAND
WM. J. D'ALEXANDER, RICHARD BIRDSONG
Whitehall 4-1234

Los Angeles 36 .....5943 W. Colgate Ave.
F. J. FULLER—Webster 1-6865

San Francisco 4 .....57 Post St.
Robert W. Walker Co.—Sutter 1-5568

Griffin, Ga. .....1106 Pine Valley Rd.
FRED J. ALLEN—Griffin 7854

Clearwater, Fla. .....1954 Jeffords Dr.
H. G. ROWLAND—(Clearwater) 39-9493

Dallas 35 .....818 Exchange Bank Bldg.
JAMES H. CASH—Fleetwood 1-4523

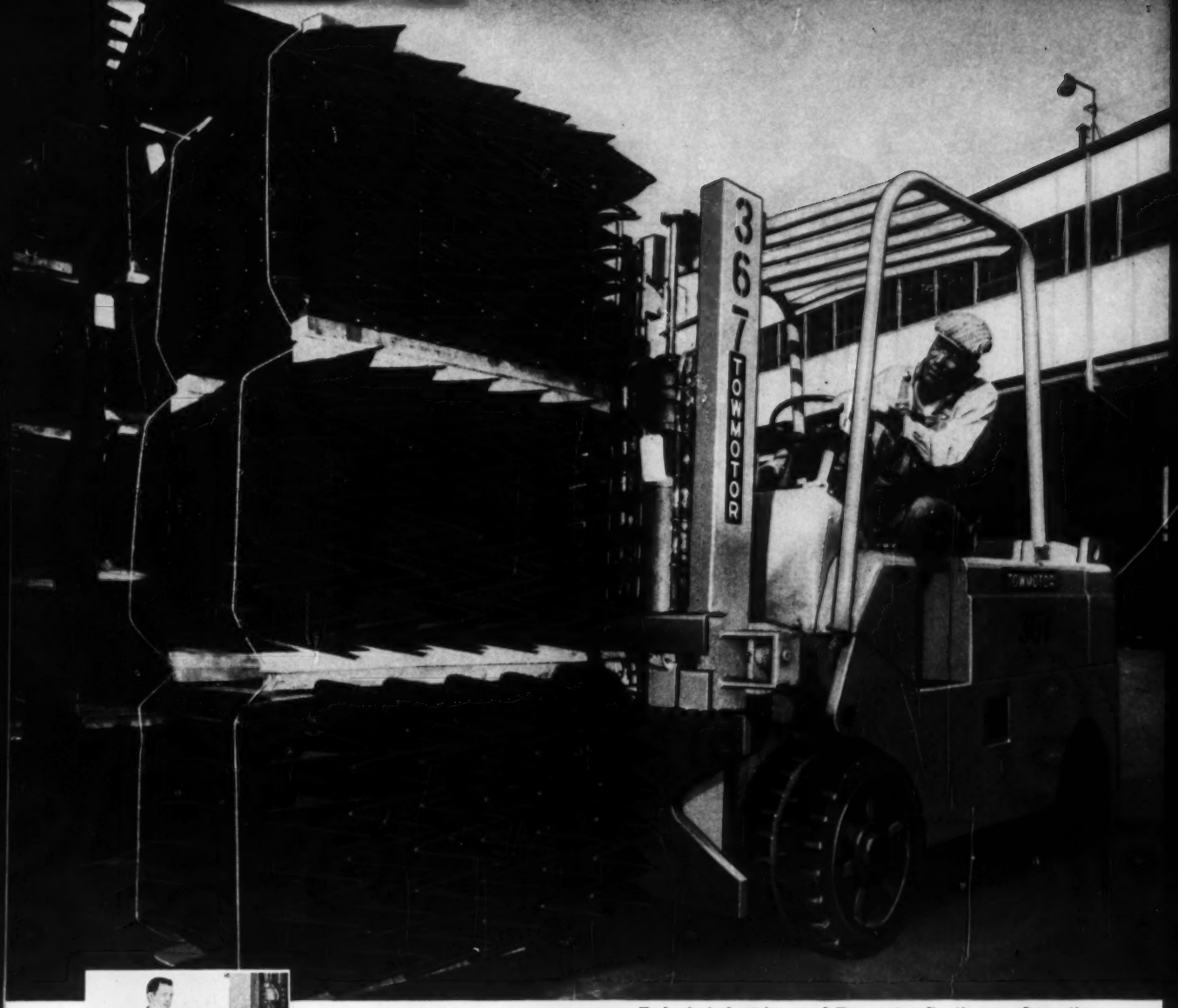
BPA

NBP

Published Every Monday by
THE PENTON PUBLISHING CO., Penton Bldg., Cleveland 13, Ohio
MAin 1-8260

GEORGE O. HAYS .....Chairman
RUSSELL C. JAENKE .....President
FRANK G. STEINEBACH .....Vice President and Secretary
FRANK O. RICE .....Vice President
JOSEPH P. LIPKA .....Treasurer and Assistant Secretary

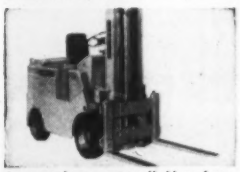
Also Publisher of
FOUNDRY, MACHINE DESIGN, NEW EQUIPMENT DIGEST, AUTOMATION
Member of Business Publications Audit of Circulation Inc., Society of Business Magazine Editors, and National Business Publications Inc.



Today's industries need Towmotor Continuous Operation

Easy on muscles! Towmotor Improved Power Steering triples driving ease; Towmotor TowmoTorque Drive adds cushioned "creep control" unequalled in the industry.

Get under hood fast! Towmotor tilt-back seat and slip-socketed panels permit 23-second access to entire engine and parts without tools . . . a mechanic's dream!



Low up-keep assured! New functional-design construction introduced in Towmotor "Pace-Maker" Series adds extra economy to Towmotor Continuous Operation. Model 540 shown.

It's a New Towmotor "Pace-Maker"...built to last!

The stamina of this "Pace-Maker" Series Fork Lift Truck will hardly surprise you—it looks like it's built for more rough-and-tumble treatment than you'll ever give it, and it is.

But slip into the driver's seat and you'll marvel. Towmotor TowmoTorque Drive makes this compact lift truck handle 5½-ton loads with unmatched ease! Operator "inches" gently up to tier—or skims over any terrain—with minimum effort. Saves extra maintenance dollars all the while.

Send for Towmotor Booklet SP-23 or ask for a convincing demonstration—or do both.

Leaders for 39 years in building
Fork Lift Trucks, Tractors and Carriers

TOWMOTOR THE ONE MAN GANG **-GERLINGER**

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation, Cleveland 10, Ohio

☐ Send free Towmotor Booklet SP-23

☐ Send free Certified Job Studies relating to our business, which is:

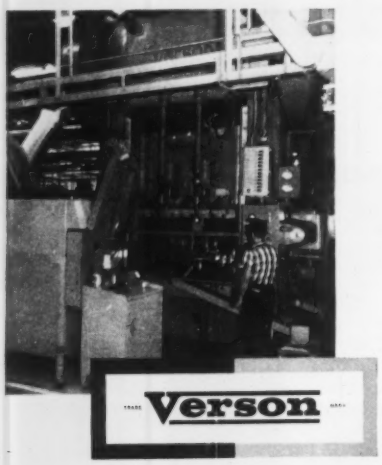
Name_____

Company_____

Address_____

Mail to **TOWMOTOR CORPORATION,** Cleveland 10, Ohio

Are you "whittling" out metal parts that could be IMPACT MACHINED at a fraction of the cost?



If you manufacture machined parts by cutting away sections of a chunk of steel until only a piece of the required size and shape remains, you may be missing an opportunity to substantially reduce your manufacturing costs.

The opportunity is Impact Machining.

Impact Machining is the practical application of the principles of cold extrusion to the manufacture of a wide variety of piece parts that formerly had to be made by metal removal processes or hot forged. In this process, suitably tooled presses cold flow metal into the required shape with little or no conventional machining . . . little or no scrap.

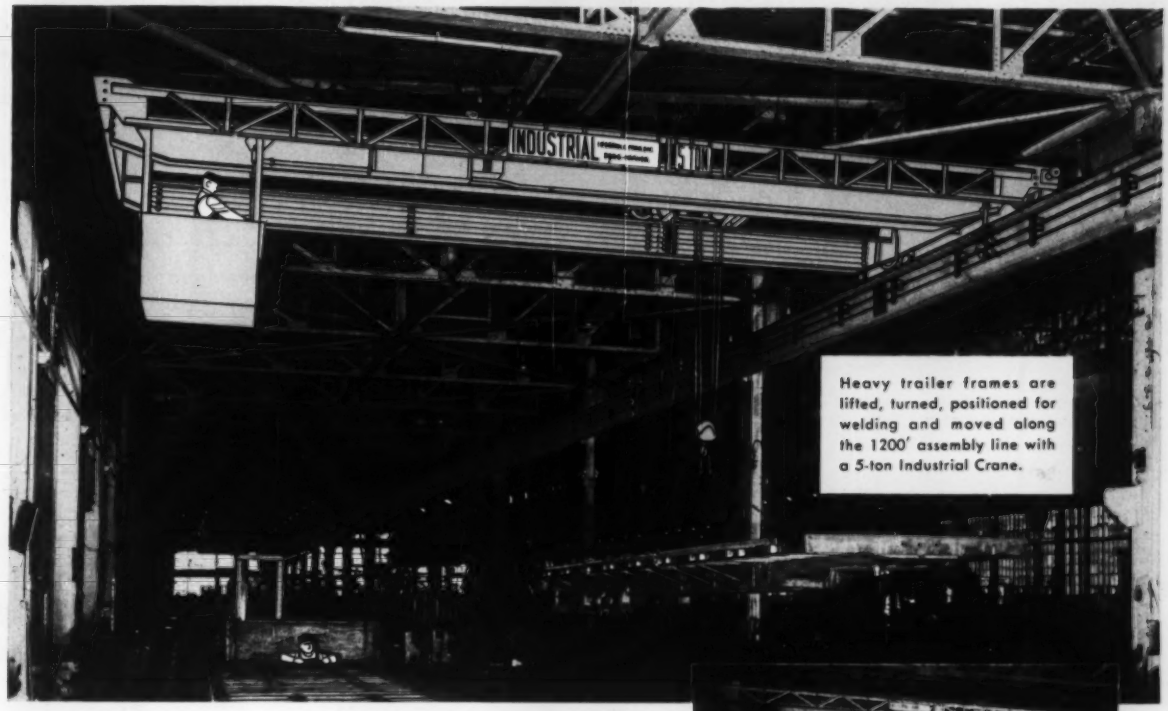
We urge that you investigate the cost cutting advantages of Impact Machining. Ask to have a Verson Impact Machining specialist go over your requirements with you or, for specific recommendations, send drawings and specifications on parts you must produce.

VERSON ALLSTEEL PRESS CO.

9318 So. Kenwood Avenue, Chicago 19, Ill. • 8300 So. Central Expressway, Dallas, Tex.

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

7 more Industrial Cranes speed production here...



Heavy trailer frames are lifted, turned, positioned for welding and moved along the 1200' assembly line with a 5-ton Industrial Crane.

Another manufacturer of highway trailers chooses Industrial!

A leading manufacturer of truck trailers uses *seven* 5-ton **INDUSTRIAL** top-running, double-girder, motor-driven cranes in its midwest plant. Two assembly bays, each 1200 feet long are served by one cab-controlled and four floor-controlled **INDUSTRIAL** cranes, moving materials and heavy frames along the assembly lines. Two other floor-controlled **INDUSTRIAL** cranes handle materials in the machine shop.

Constant, regular use in rugged service such as this proves to **INDUSTRIAL** users that *Industrial Cranes are best for the long run.*

- Industrial builds a complete line of cranes for every need. Write for catalogs.

Agents in all principal industrial cities.

Find Your Nearest Dealer in The Yellow Pages

Floor-controlled assembly crane

Two floor-controlled Industrial 5-ton cranes move these heavy duty goose-neck trailers along a 1200-foot assembly line. The frames weighing 7000 lbs. and more are placed with precision and speed.

One hand control

Industrial's exclusive control box design makes one-hand control easy.

Industrial Cranes — Ingersoll Products — B-W — Borg-Warner

TR 558 C

Borg-Warner® INDUSTRIAL CRANES

1550 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

PRODUCTO

Quality Die Sets

In the production of die sets, the pig iron portion of the charge consists of equal parts of Chateaugay Pig Iron and Republic Malleable Pig Iron. Republic, as the only producer of both Northern and Southern Irons, offers industry's most complete line of all grades of merchant pig iron. In addition to Chateaugay and Malleable, Northern grades include Bessemer, Foundry, and Basic. Southern furnaces produce Foundry and Basic Irons.

This 6-ton die set used in heavy automotive stamping is but one of the many types and sizes produced by The Producto Machine Company using Republic Chateaugay and Malleable Pig Irons.

Start with Republic Pig Irons

The Producto Machine Company, Bridgeport, Connecticut, combines skill and modern foundry equipment with the finest raw materials to produce the highest quality die sets for the metal stamping industry.

Producto casts die set parts in their own foundry, using only raw materials with a definite known analysis, including Republic Pig Irons and ARA rail quality scrap. Republic Chateaugay and Malleable Pig Irons' year-in, year-out uniform chemistry help Producto produce high quality, laboratory-controlled castings. The company has found that there is no better, no more economical means for insuring strong, flaw-free, easy-to-machine castings.

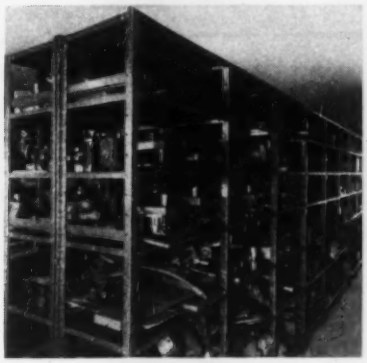
Chateaugay's uniform distribution of chemical elements produces a dense grain structure which results in economical machining—plus excellent wear-resistance. Loss rate caused by flaws and porosity is held to an absolute minimum.

Other characteristics of Chateaugay are unequalled by any domestic pig iron. Its high carbon and unusually low sulphur, phosphorus, and manganese content make it ideally suited for production of ductile iron castings.

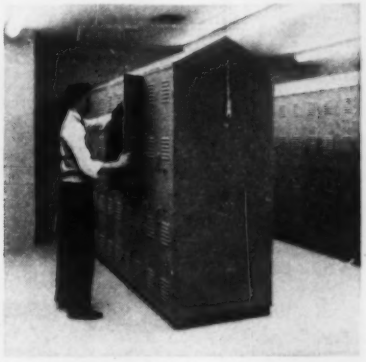
A Republic Pig Iron Metallurgist will give you all the facts on Chateaugay and Malleable Pig Irons for quality castings as well as complete details on other Republic Irons.

Send the coupon today for prompt, expert metallurgical service, or for more information on Republic's complete line of irons.

THIS STEEL "HOT" BOX MEETS ALL REQUIREMENTS for handling hot work in foundries. It is made of Republic High Strength Steel and is designed to withstand plenty of use and abuse. The box is 53" long x 38" wide x 26" deep. Corrugated-steel construction of the sides and bottom assures long service life at lowest per-year-cost. Stacking brackets are securely welded to the top corners of each box permitting tiering to any practical height. 16-inch clearance is provided for easy handling by fork lift truck. Send coupon for catalog on the complete line of Republic Materials Handling Equipment.



STRENGTH TO WITHSTAND ENORMOUS WEIGHTS—Republic Wedge-Lock Steel Shelving is specifically designed for high stacking of such heavy items as dies, patterns, castings, etc. Joints actually grow tighter as weight increases. There's no distortion or instability. Result is efficient use of floor space plus easy rearrangement to meet future needs.



STRONG, STURDY, RIGID Republic Steel Lockers combine smart styling and design with simple construction for fast, easy installation. Tough, Bonderized steel base guards against underfinish corrosion that causes flaking and peeling. Give employee morale a boost with handsome Republic Industrial Lockers. Write for illustrated booklet on types, prices, specifications.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. ST-6485
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Pig Iron Metallurgist call.
Send more information on:
☐ Shelving
☐ Materials Handling Equipment ☐ Lockers

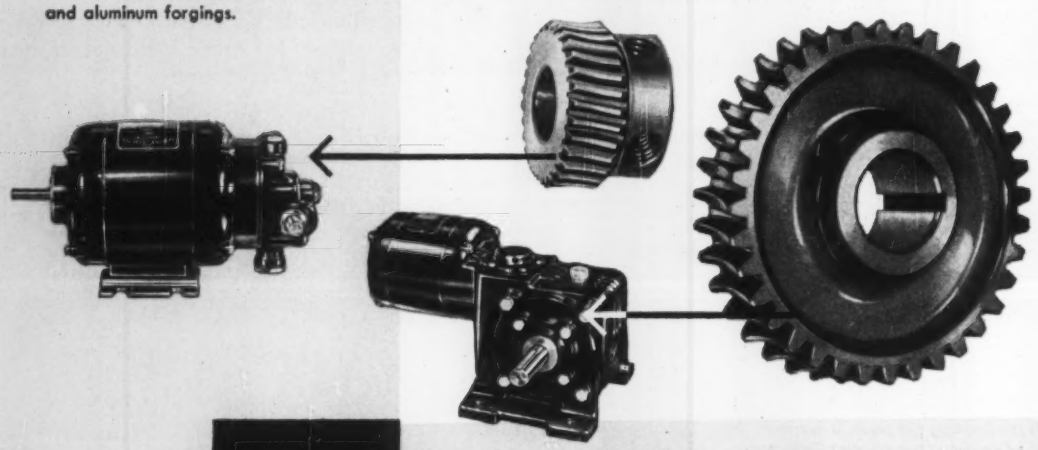
Name _____ Title _____
Company _____
Address _____
City _____ Zone ____ State _____

MUELLER BRASS CO. forged gears improve dependability and performance of BODINE electric motors

For combined high shear strength and maximum wear life in their single and double reduction speed reducer motors, Bodine Electric Company of Chicago uses gears forged from Mueller Brass Co. 603 Alloy.

Bodine has specified Mueller Brass Co. forged gear blanks because of their consistently high quality . . . there is no porosity, foreign inclusions or defects typical of cast blanks. The hot working of the metal followed by heat treatment to the desired physical properties produces a refined grain structure to give uniform machining and wear in service. The forged blanks are consistent in size and held to close tolerances. Bodine has also found that the excellent machinability of the blanks in the hobbing operation increases overall hob life.

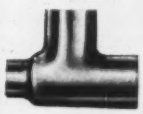
For forgings of high tensile strength, high density, minimum porosity, light weight, corrosion resistance, good machinability and low costs with little scrap loss, it pays to specify forgings from the Mueller Brass Co., the world's largest producer of brass, bronze and aluminum forgings.



only the man from Mueller Brass Co.

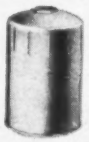
can offer unbiased advice on the "one best way" of producing your parts, because Mueller Brass Co. is the *only* fabricator in the country offering all these methods of production . . . assuring you the best product at the best price . . . made the *one* best way.

Write today for complete catalogs on any of these products.



FORMED COPPER TUBE

PLASTICS INJECTION MOLDING



COLD-PREST IMPACT EXTRUSIONS

SCREW MACHINE PRODUCTS

POWDER METAL PARTS

RED BRASS CASTINGS

Also producers of: Super Cutting Red Tip Brass Rod • Aluminum Extrusions Aluminum Sheet, Coil and Strip • Plastic Pipe and Fittings • Copper Tube and Solder Type Fittings •

MUELLER BRASS CO. PORT HURON 26, MICHIGAN

262

Stage Set for '59 Industrial Shows

Two shows will open the 1959 industrial exposition season Jan. 26.

The tenth annual Plant Maintenance & Engineering Show will be held in Cleveland's Public Auditorium Jan. 26-29. Clapp & Poliak Inc., New York, will manage it and the Plant Maintenance & Engineering conference, a concurrent event.

Philadelphia's Convention Hall will be the scene of the International Heating & Air Conditioning Exposition, Jan. 26-29. Society of Heating & Air Conditioning Engineers is the sponsor. International Exposition Co., New York, will manage the show.

The 11th biennial Western Metal Exposition and Congress will be held Mar. 16-20 in Pan-Pacific Auditorium, Los Angeles. American Society for Metals is the sponsor.

"For Mankind's Progress" is the theme of the 1959 Nuclear Congress, Apr. 5-9, at Cleveland's Public Auditorium. Atomfair, an exposition at which manufacturers of equipment used in the nuclear field will display their latest developments, will be staged at the same time. Engineers Joint Council is the co-ordinator of the event.

The American Welding Society's Welding Show will be at the International Amphitheatre, Chicago, Apr. 7-9.

The Design Engineering Show & Conference is scheduled for May 25-28 at Convention Hall, Philadelphia. Clapp & Poliak will manage the show.

On June 9 the Material Handling Institute's national exposition of material handling equipment will be staged at Cleveland's Public Auditorium.

Chicago will be host to two major shows this fall. The first will be the International Instrument-Automation conference and exhibit, Sept. 21-25. The Instrument Society of America will sponsor the show. On Nov. 2-6, the American Society for Metals annual National Metal Exposition & Congress will move on the scene. Both shows will be at the International Amphitheatre.

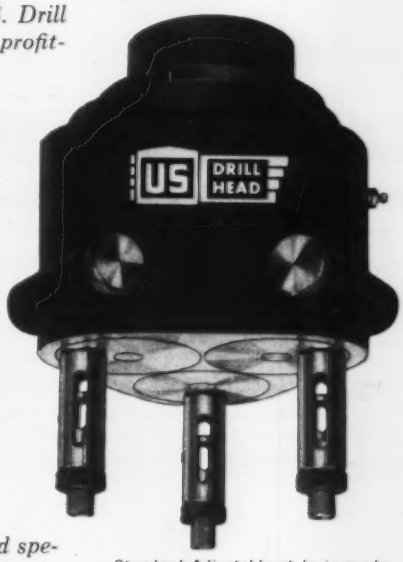
For other major meetings and exhibits in 1959, see Page 401.

Q. Are you drilling holes in your MONEY POCKET?

A. *NOT* when you use *U.S. DRILL HEADS!*

That's because Adjustable U. S. Drill Heads are designed and built for profit-making performance!

Positive all-gear drive . . . Shaved gears for smooth, quiet operation . . . High factor of safety in design for greater reliability . . . Anti-friction bearing mounting of shafts and spindles for permanent alignment . . . Double Duty tools—when your drilling machine has a reversing spindle, you can drill and tap the same hole pattern with one head.



Standard Adjustable style is made in 5 models—58 sizes. A rugged head ideally suited for high production and flexibility.

Write for Catalog AD-57. Or, send specifications of your requirements. No obligation, of course.

US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

Tuffy® Tips On

SAFE USE OF SLINGS AND HOIST LINES

Lifting Strains Take High Toll of Injuries

Did you know that in some states one in every six compensation claims involves back injuries? And that one insurance company says back injuries constitute 60% of their claim expense?

Hernia is another hazard of materials handling. One manufacturer reported 75% of his compensation claims involved hernias. This high incidence of hernias and back injuries can be greatly reduced by proper lifting equipment and methods.

What can you do to reduce materials handling accidents? Here are some of the answers:

1. **Teach** your workers rated load factors. Warn them not to overload slings.

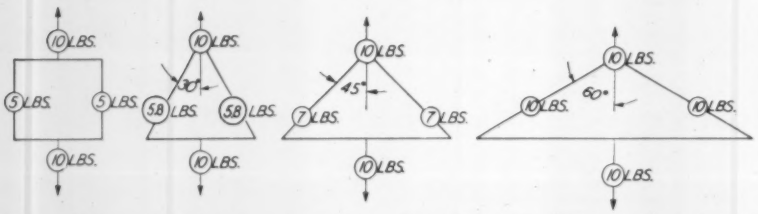
2. **Use** the right size hoist for every heavy lifting job. Don't put the load on human muscle.

3. **Show** workers how to rig hoists properly and safely. Load chains shouldn't be used as slings. Previous distortion and weakening of links may cause them to break even with a light load.

4. **Inspect** hoist load brakes often. Slipping or dragging brakes should never be used.

5. **Be sure** to use the proper sling for the job. Don't assume that all slings made of wire rope are right for all lifting operations.

How Sling-Leg Load Increases with Increased Fleet Angle



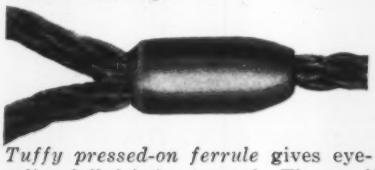
These four drawings show approximate load increases on each leg of a bridle sling as the vertical angle of spread between legs increases. For accurate factors for the various angles, refer to your Tuffy Sling Handbook. (Don't have one? Write Union Wire Rope Corporation. Specialists in high carbon wire, wire rope, braided wire fabric and stress relieved wire and strand. 2160 Manchester Avenue, Kansas City 26, Missouri.)

Get Your FREE Tuffy Sling Handbook

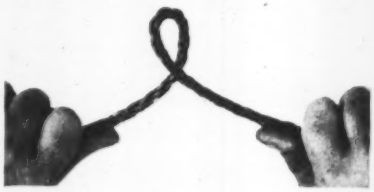
Gives full data on Tuffy Slings. Types, dimensions, weights and rated loads. Also contains an expanded section on fittings — many not previously shown. Write for your copy now.

Why Tuffy Slings Do A Better Job More Safely

Tuffy Slings have a combination of extra strength and super flexibility. The patented machine-braided fabric is the secret. It gives Tuffy greater strength, faster handling, longer life, greater safety than ordinary slings—at a cost to service life ratio that figures low. And it's so flexible that kinks can be pounded out without material damage.



Tuffy pressed-on ferrule gives eye-splice full fabric strength. The steel ferrule is applied under tremendous pressure. It literally flows into spaces between wires and strands. The friction force thus created gives the eye-splice 100% of the fabric strength. And the streamlined Tuffy ferrule leaves no openings or rough projections to snag or injure hands.



Tie a knot in a Tuffy Sling? Pull it as tight as you can. Even if you kink it, it's still easy to straighten out with no material damage to the sling.

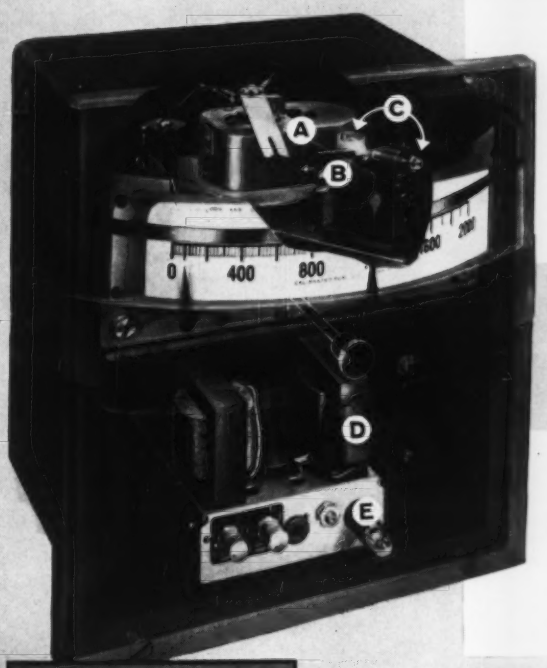
See Your Tuffy Distributor

He's stocked for fast delivery of all your Tuffy Slings and Union Wire Rope needs.

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products



MEASURING UNIT

A. A thermocouple signal to a d'Arsonval galvanometer, the only moving part, moves the indicating pointer up scale.

B. Aluminum vane adjusts the amount of light received by the photocell from the operating lamp.

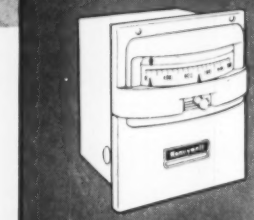
C. If operating lamp or photocell fails, output voltage assumes a value equal to high temperature.

***Pyr-O-Volt* has built-in voltage regulator to maintain voltage within ± 1% of level required for maximum operating stability. Spare operating lamp supplied. Thermocouple burnout protection optional. Available in horizontal and vertical case.**

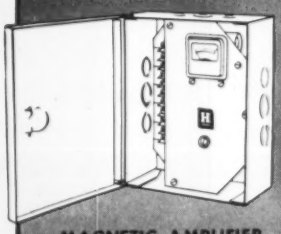
CONTROL UNIT

D. A one-stage magnetic amplifier amplifies small current from the photocell in the measuring unit. This is the only active electronic element in the controller.

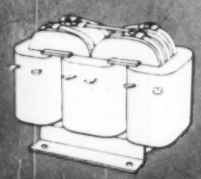
E. Pilot light goes out on line power failure.



MILLIVOLTMETER CONTROLLER



MAGNETIC AMPLIFIER



SATURABLE REACTOR

For your electric heating applications . . .

Use this accurate, dependable *Pyr-O-Volt** controller

- **No tubes to wear out**
- **Voltage regulation**
- **Fail-safe design**
- **Contactless, stepless control**

Here's an accurate instrument for reliable stepless control of saturable reactors, r.f. generators and other power amplifiers. It has a proportional band adjustable from 2 3% to 5%, and a manual reset adjustment which shifts the control point over 100% of the proportional band.

The *Pyr-O-Volt* controller can control saturable core reactors up to 100 kva, if used with a Brown magnetic amplifier. You can also use this proportional output millivoltmeter-controller with the General Electric *Reactrol***, and with the Westinghouse *Furnatron*.*** Complete packaged systems available.

Contact your nearby Honeywell field engineer for complete details. He's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Phila. 44, Pa.

Honeywell

*Tradename, Minneapolis-Honeywell Regulator Co.
**Tradename, General Electric Co.
***Tradename, Westinghouse Electric Corp.

H HONEYWELL

First in Control

CF&I WIRE...

PACKAGED for YOUR PRODUCTION

Reels
(500-800 lbs. capacity)

Disposable Spools
(5-70 lbs. capacity)

Fibre Drums
(200-600 lbs. capacity)

Standard Coils, paper-wrapped, steel-strapped or wire-tied

When you buy CF&I Steel Wire, you have a choice of all these cost-cutting, time-saving wire packages—in addition to standard coils and reels. If you want wire in an extra long length; simplified wire inventory control; easier in-plant wire handling; or wire that is kept clean, CF&I has a wire package that will fulfill your needs. By specifying the wire package best suited to your operations, your CF&I wire order will arrive at your plant packaged for your production.

Remember, a wide range of gages and finishes is available. Order all your steel wire requirements—from a coil to a carload or mixed carload—packaged for your production from a single source of supply—CF&I. Contact our nearest office listed below.

PACKAGED for YOUR PRODUCTION

6341

CF&I

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth Houston • Kansas City • Lincoln • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita • **PACIFIC COAST DIVISION**—Los Angeles Oakland • Portland • San Francisco • San Leandro • Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT**: Calgary • Edmonton • Vancouver • Winnipeg

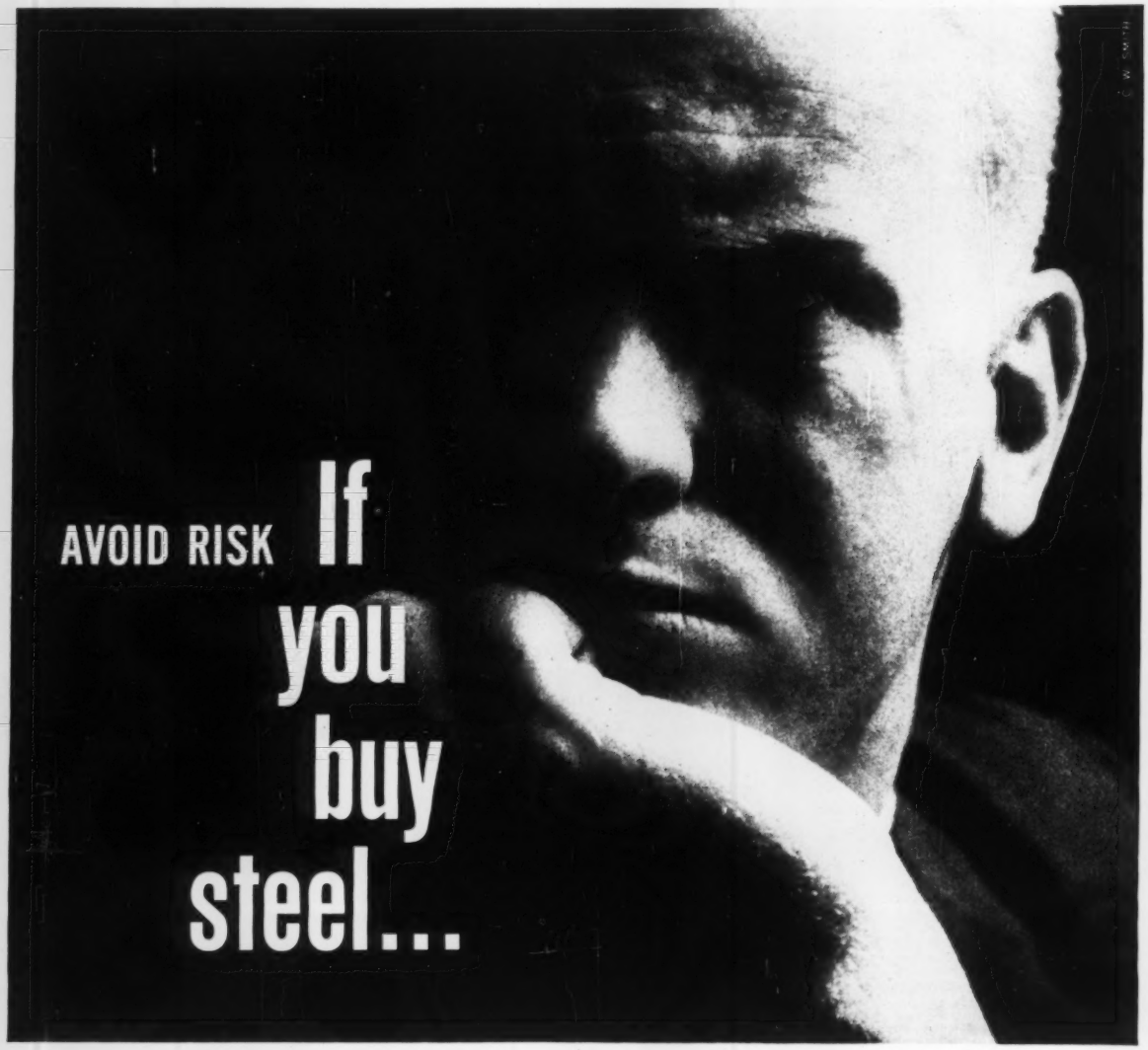
Steel strapped Wooden Racks

Shaped Coils (600-2300 lbs. capacity)

Stem pack (500-700 lbs. capacity)

Returnable Spiders (2000-4000 lbs. capacity)

Steel strapped Coils (200-2000 lbs. capacity)



USE OUR INVENTORY to cut your maintenance costs

To keep a general-store inventory of repair-type steel inflates your maintenance costs and ties up capital *uselessly*.

Many people are closing out this kind of dust-gathering inventory to put themselves in a better competitive position.

They buy from their Steel Service Center, use our technical know-how, get most stock cut-to-size . . . *promptly*.

It makes sense. Couldn't *you* save costs of storage, space, handling, cutting, wastage and obsolescence if you were to do the same thing? Couldn't you free capital now tied up in inventory? Wouldn't you save in other ways, avoid big-inventory risks, yet still meet maintenance and repair deadlines?

Wouldn't *you* be in a better competitive position? Compare all your costs of possession for steel with what Service Center steel would cost you. Use the chart. Or get the booklet *What's Your Real Cost of Possession for Steel?* from your nearby Steel Service Center. American Steel Warehouse Association, Inc., 540 Terminal Tower, Cleveland 13, Ohio.

COST OF POSSESSION FOR STEEL IN YOUR INVENTORY

Per ton delivered	
Cost of capital:	
Inventory	
Space	
Equipment	
Cost of operation:	
Space	
Materials handling	
Cutting & burning	
Scrap & wastage	
Other costs:	
Obsolescence	
Insurance	
Taxes	
Accounting	
TOTAL	

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

Per ton, cut-to-size, and delivered

TOTAL _____

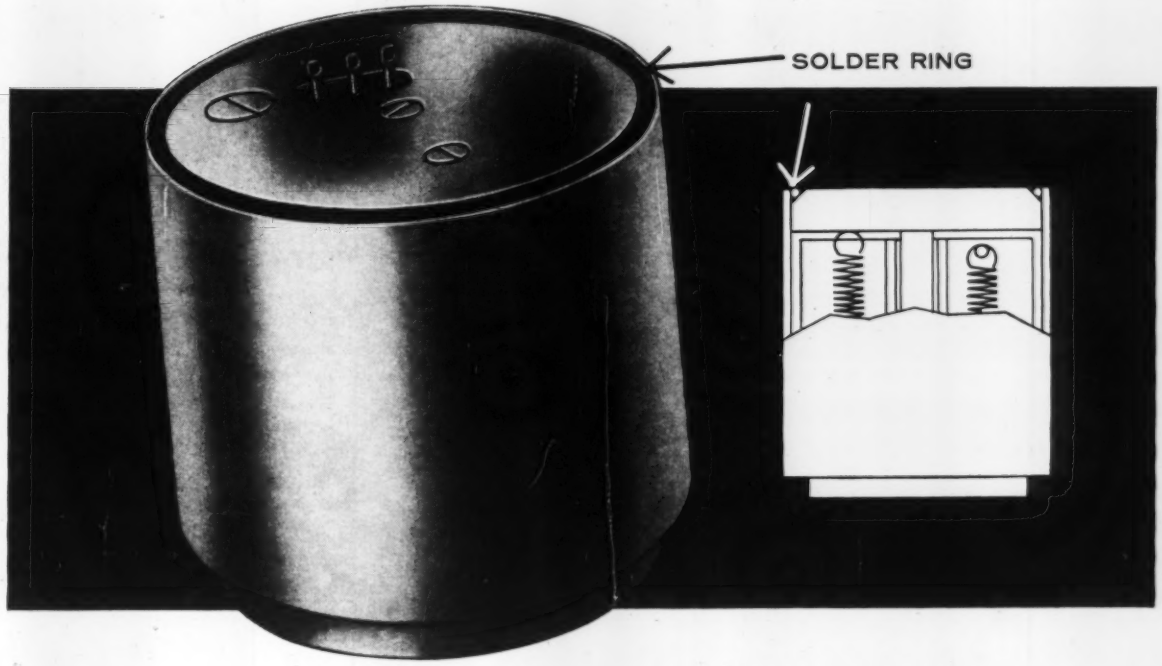
AMERICAN STEEL WAREHOUSE ASS'N

The American Steel Warehouse

. . . YOUR STEEL SERVICE CENTER

Precision soldering 7 Times Faster...

with TOCCO Induction Heating*



When G. M. Giannini and Co., Inc., Pasadena, California, switched from old-fashioned methods to TOCCO Induction Heating they increased production of these high-precision accelerometers from 4 to 30 per hour—with a commensurate *decrease* in production costs.

Here's what a Giannini official has to say about the TOCCO installation: "Prior to using TOCCO for this purpose, we had tried soldering irons, normal torches, resistance sealing, and even threaded screw fittings, with uniformly poor results. Essentially, the TOCCO unit has permitted us to build, in production quantities, oil-filled hermetically sealed units that could not be produced in any other way."

Whether your production bottleneck involves soldering, brazing, heat treating or heating for forming it pays you to investigate TOCCO as an economical way to do it better, faster and at lower cost.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today—NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. S-1, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering".

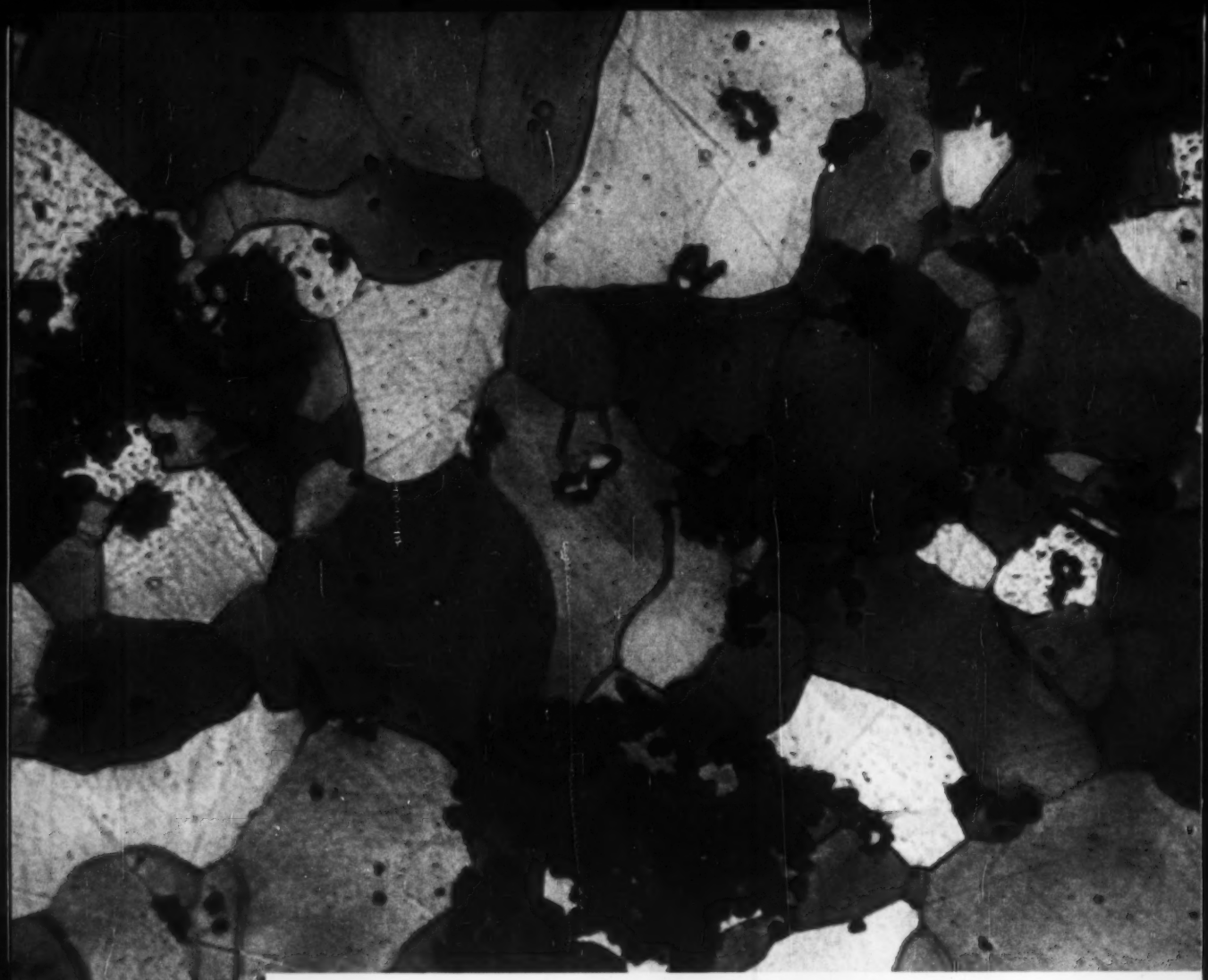
Name_____

Position_____

Company_____

Address_____

City_____ **Zone**____ **State**_____



Color micrograph of heat tinted section of ferritic Malleable iron showing random dispersion of temper carbon nodules in ferrite. 625X magnification.

Usability is Malleable

In the growing world of metals, certain requirements remain basic: strength . . . versatility . . . economy. Malleable iron castings uniquely answer all three. Malleable castings provide more strength per dollar than any other metal . . . are the most machinable of all ferrous metals of similar hardness.

From the great range of Malleable irons now produced in modern Malleable foundries, you can select exactly the right metal to fill your most demanding needs for endurance, resistance to impact and wear, ductility and constant uniformity. No other metal offers you so much at so low a cost.

For information or service, call on one of the progressive firms that identify themselves with this symbol—

MEMBER
MALLEABLE
CASTINGS COUNCIL

If you wish, you may inquire direct to the Malleable Castings Council, 1800 Union Commerce Building, Cleveland 14, Ohio, for information.

These companies are members of the

MALLEABLE CASTINGS COUNCIL

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Link-Belt Company, Indianapolis 6
Muncie Malleable Foundry Co., Muncie
Terre Haute Mall. & Mfg. Corp., Terre Haute

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW JERSEY
Meeker Foundry Company, Newark 4

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Canton Malleable Iron Co., Canton 5
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Badger Malleable & Mfg. Co., S. Milwaukee
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

How to Select the Best Metal to Perform a Given Set of Functions

Any equipment part can be described, at least approximately, in terms of the functions it must perform. That is, it must provide a certain strength plus resistance to wear, fatigue, impact or corrosion. The finished part must provide the best combination of all necessary factors at the lowest possible cost — a cost that must include machining, finishing and assembly where applicable.

Unique Production Method Combines Desirable Characteristics

The amount and form of carbon in ferrous metals is of prime importance. The carbon content of Malleable iron (2.00 to 2.60%) provides good fluidity at the pouring stage. Yet neither flake graphite nor combined carbon is present in finished standard Malleable iron.

As the photomicrograph of standard Malleable iron shows, the carbon has been transformed into temper carbon nodules in a matrix of ferrite during the heat-treatment given *all* Malleable iron castings. The result is a metal with a unique combination of high strength, toughness and machinability.

Pearlitic Malleable irons differ from standard, or ferritic, Malleable only in that a controlled amount of the carbon is combined with the iron to form a pearlitic matrix around the temper carbon nodules. This increases strength, hardness, wear resistance and modulus of elasticity, while retaining good ductility and machinability.

TENSILE PROPERTIES — A.S.T.M. MINIMUM SPECIFICATIONS

Standard and Pearlitic Malleable Irons				
Designation	Tensile Strength p. s. i.	Yield Strength p. s. i.	Elongation % in 2 in.	Ratio of Tensile to Yield %
Standard				
35018	53,000	35,000	18	66
32510	50,000	32,500	10	65
Pearlitic				
45010	65,000	45,000	10	69
45007	68,000	45,000	7	66
48004	70,000	48,000	4	69
50007	75,000	50,000	7	67
53004	80,000	53,000	4	66
60003	80,000	60,000	3	75
80002	100,000	80,000	2	80

Strengths up to 135,000 p.s.i. tensile and 110,000 p.s.i. yield are produced commercially under individual producers' specifications.

TYPICAL BRINNELL HARDNESS NO. RANGES

Pearlitic Malleable Irons							
Designation	45010	45007	48004	50007	53004	60003	80002
B. H. N.	163-207	163-217	163-228	179-228	197-241	197-255	241-269

New Savings Result

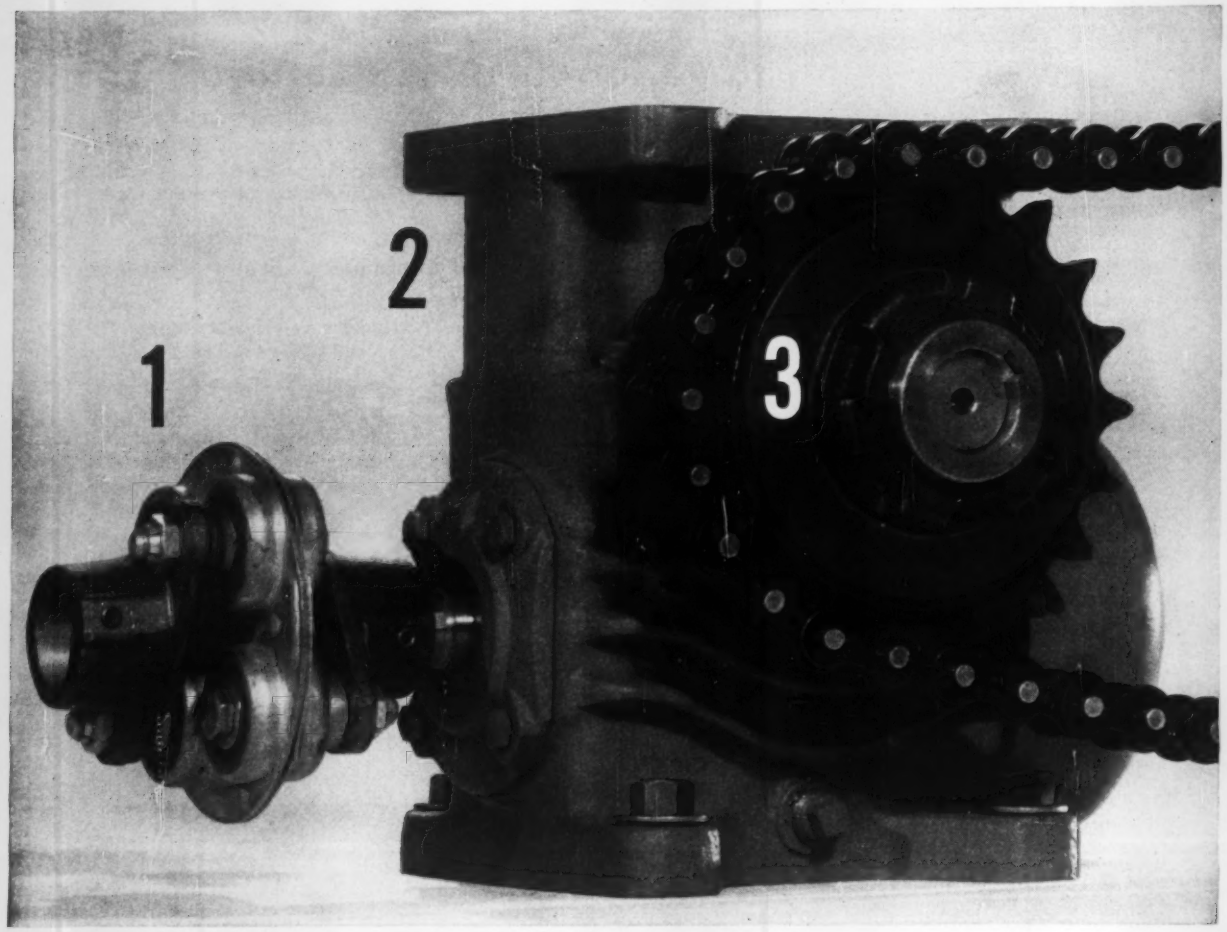
From the wide range of properties obtainable, a Malleable iron may be selected that will most completely meet ideal design and functional requirements. Because of the great latitude of producible sizes, from a fraction of an ounce to hundreds of pounds, Malleable can be used for a wealth of applications.

Malleable iron's economy is derived in two ways. First, the casting process is generally accepted as the most economical method of producing a finished part. Secondly, being the most machinable of all ferrous metals of similar hardness, cast or otherwise, Malleable iron castings provide exceptional economies in time, tool and power consumption.

Today's Malleable iron castings offer tremendous strength, uniformity, versatility and economy. The producers of Malleable castings are anxious to assist you in getting maximum "usability." Why not let their modern design, testing and production facilities work for you?

Send for Special Data Unit

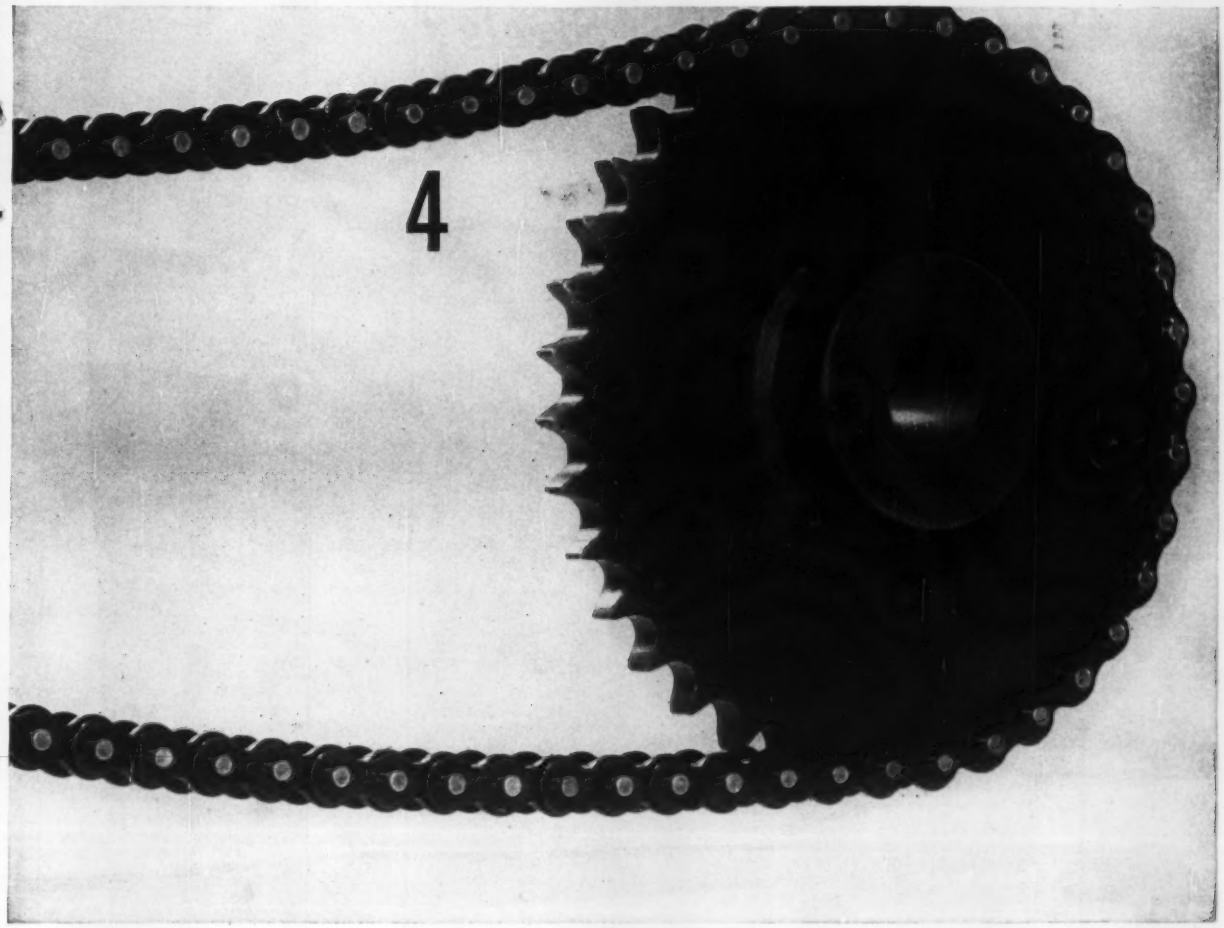
Your copy of Data Unit No. 101 containing additional information on the benefits you can derive from Malleable iron castings is available from any member of the Malleable Castings Council. If you wish, you may direct your request to **Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.**



Morse's entry into the speed reducer field means:

Nobody can service your as completely as Morse, all four of these power

1 Couplings and Driveshafts	2 Eberhardt-Denver Speed Reducers	3 Clutches	4 Chain and "Timing" Belt Drives
Morflex	PoweRgear®	Torque Limiter	Roller Chain
Flexible Chain	Worm Gear	Cam	Silent Chain
Radial	Helical	Overcenter	Hy-Vo® Drives
Nylon	Gearmotors	Pullmore	"Timing"® Belt



power transmission needs because only Morse offers transmission components

REMEMBER: The toughest jobs in power transmission come to Morse, because *only Morse* offers one-source service on all four of these basic components . . . and backs them up with technical know-how based on over 60 years' experience solving power transmission problems.

MORSE

MORSE B-W *

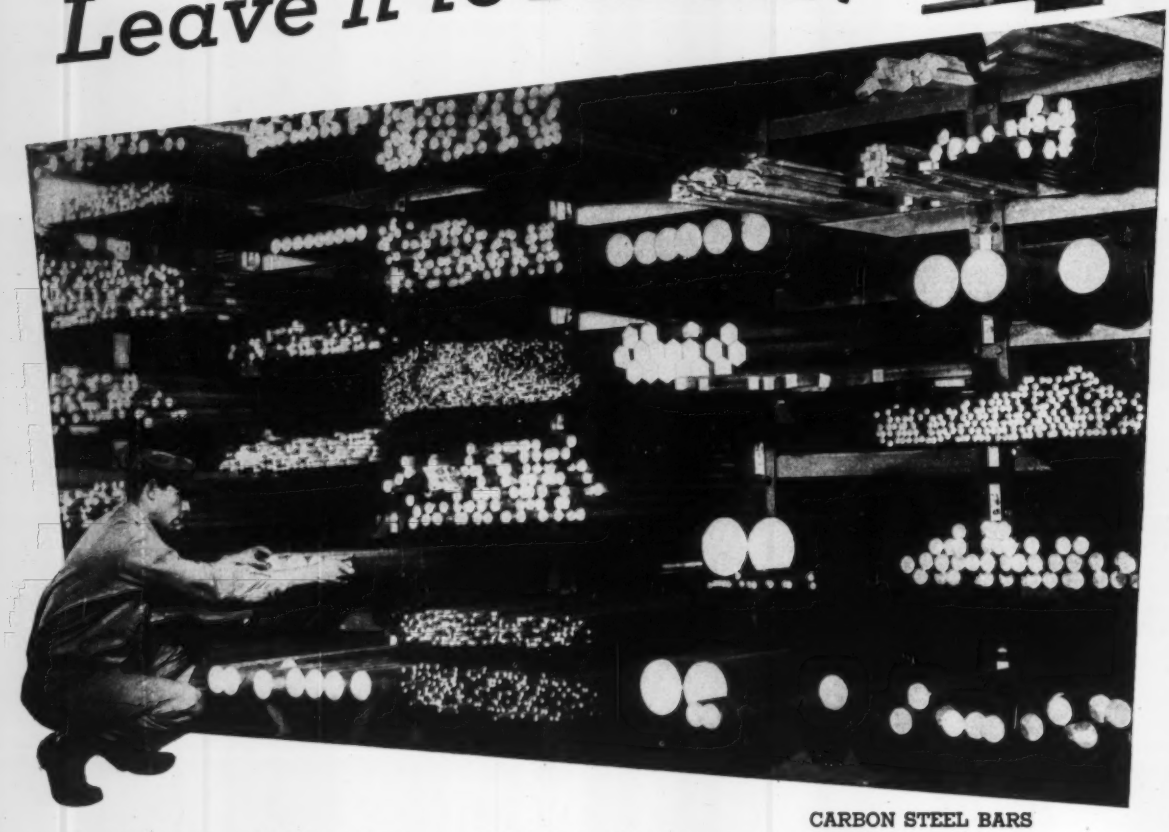
*Trademark

A BORG-WARNER INDUSTRY

MORSE CHAIN COMPANY, Dept. 2-19, ITHACA, NEW YORK. Export Sales: Borg-Warner International, Chicago 3, Illinois

Carbon and Alloy Steels?

Leave it to FRASSE!



There's a wide selection of carbon and alloy steels to choose from when you work from Frasse stocks! You'll find a complete size range of carbon bars and shafting—as well as commercial and aircraft quality alloys . . . ready for immediate delivery to your plant.

In all, you can pick from 20 different grades—any one of 2001 sizes. Frasse has a size and grade suitable for any application . . . and steel specialists who can assist you with grade selection and methods of fabrication.

You get . . . broad selection, speedy availability, practical engineering collaboration. Add them up—and it's *Frasse for carbon and alloy steels.* Check the grade listings shown—place your next order with Frasse. It's a practice you'll find convenient—and far more economical than maintaining your own inventory.

CARBON STEEL BARS
Cold Finished
C1018 • C1045 • B1112 • B1113
C1212 • C1213 • B1113X • C1117
C1137 • Ledloy

ALLOY STEEL BARS
Cold Drawn and Hot Rolled
AISI 4615 • 8620 • E9310 • E4130
4140 • 4142 • E4340 • E8740
4140 H. T. • 4142 H. T.

PLUS...

Precision Shafting
Special Finish
Turned & Polished Shafting · Drill Rod
4130 Aircraft Quality Sheets

Peter A. Frasse & Co., Inc.

NEW YORK 13, N. Y.
17 Grand St.
WAlker 5-2200

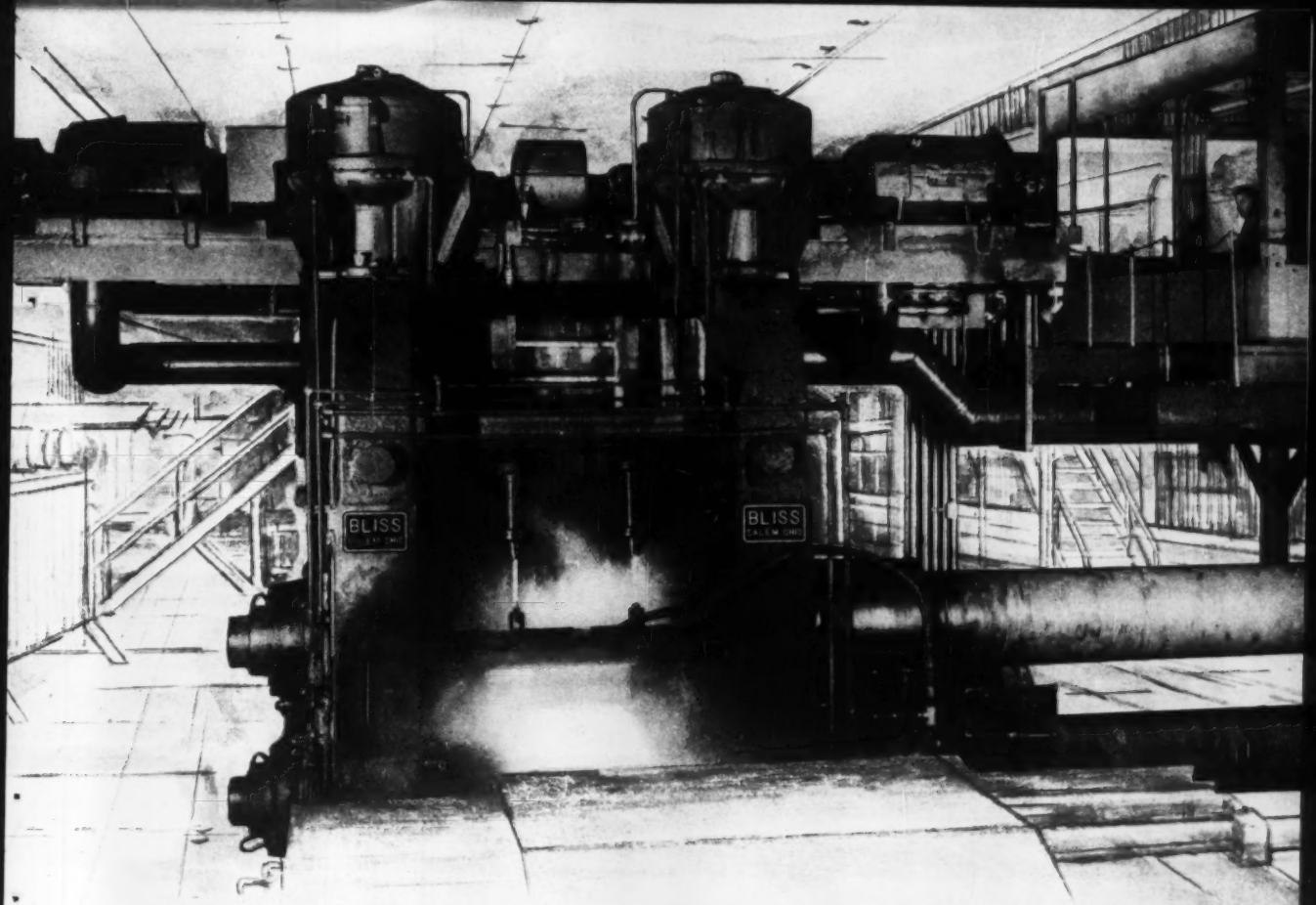
PHILADELPHIA 29, PA.
3911 Wissahickon Ave.
BAldwin 9-9900

BUFFALO 7, N. Y.
P.O. Box K, Sta. B
BEdford 4700

SYRACUSE 1, N. Y.
P.O. Box 1267
HOward 3-8655

HARTFORD 1, CONN.
P.O. Box 1949
JAckson 9-6861

LYNDHURST, N. J. • BALTIMORE, MD. • ROCHESTER, N. Y.



Empire-Reeves changes one mill stand, gains 85% boost in hot strip capacity

The famous hot strip line at the Mansfield, Ohio plant of Empire-Reeves Steel Corporation... the first mill in the world to roll fine-gage strip from ingot in a straight line without a reheat... has just had its capacity practically doubled by replacing a three-high one-way intermediate roughing mill with the new Bliss 38" x 52" reversing mill shown here.

Before the addition, the line averaged fifteen 4-to-5-ton ingots per hour. With the new Bliss mill, capacity ranges to 28 to 30 ingots per hour. Five-inch slab coming from the slabbing mill at the head of the line is reduced to ½-inch, where formerly the slabber had to roll the ingot into ¾-inch slab before the single pass through the old intermediate rougher.

Efficiency of the new mill is further enhanced by the use of a control system that automatically resets the mill between passes at the touch of a button.

Besides the new mill, Bliss' Rolling Mill Division built and installed a new shear that crops the strip ends before the strip enters the finishing train, and provided the new expanding-mandrel type downcoiler at the end of the line.

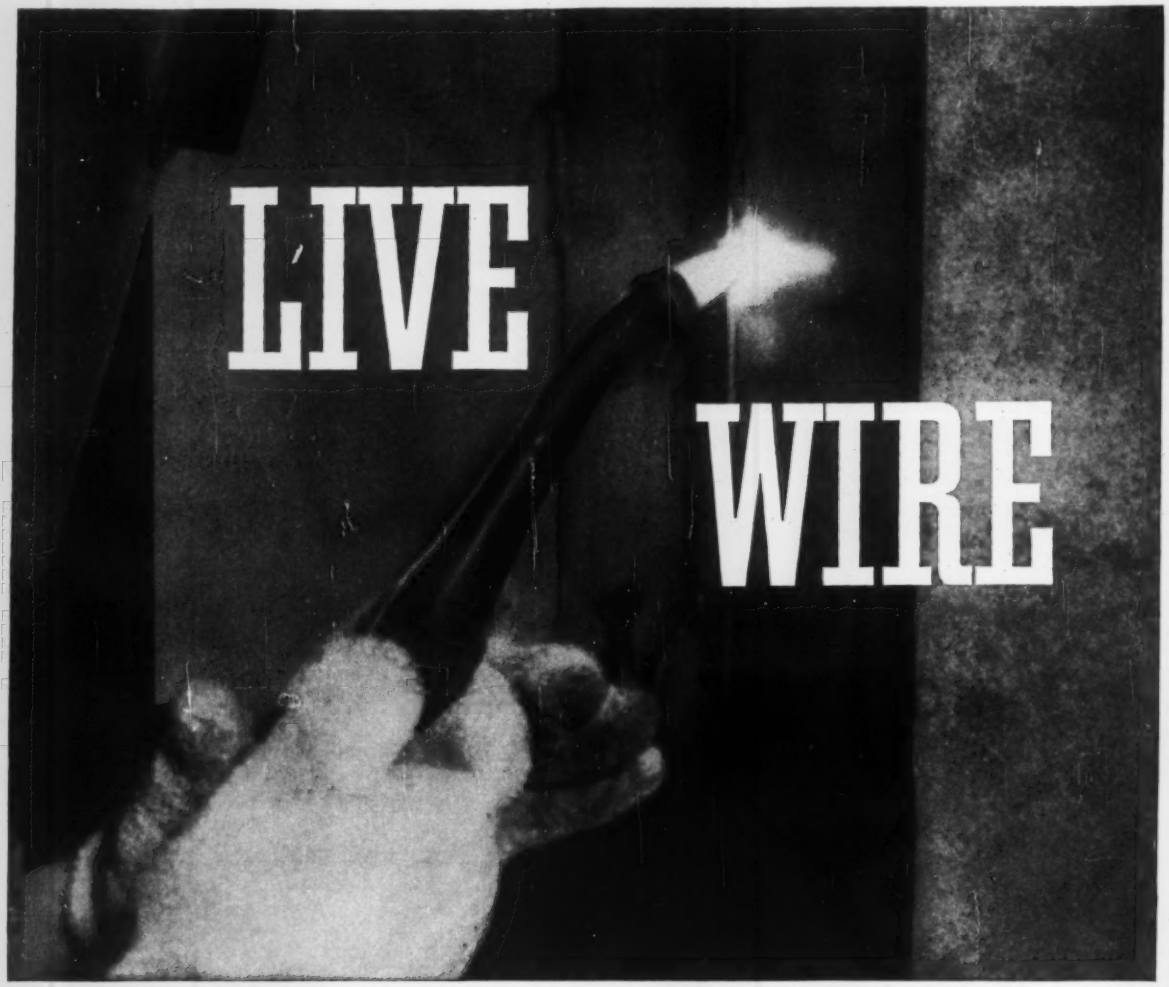
Whether you're interested in a single mill or a complete rolling plant, you'll find that the Bliss Rolling Mill Division will bring a sharp insight to your special rolling problem . . . an insight that can translate mill design and layout into striking new economy and efficiency. For examples of its work, write today for a free copy of the new 84-page Bliss Rolling Mill Brochure, Catalog 40-B.

BLISS
SINCE 1857

Bliss is more than a name . . . it's a guarantee

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio



New design in Sigma hand welding torches

Here is a new, lightweight torch—only 16 ounces—for manually welding light-gage steels. Sigma ST-2 welds in all positions with no change in control or current settings. Welds .030- to .100-in. sheet, using low-voltage short-arc technique with .020- and .030-in. hard-drawn wire. For 200 amp continuous service.

Balanced design makes handling easy. Service lines enter through rear of handle—a convenience in cramped quarters. Start-stop switch on handle, easy to reach. Nozzle has a 60° curve for maximum weld visibility.

Sigma ST-2 makes high-quality welds at high speed. Seams require no cleaning . . . distortion is at a minimum. Inert gas shielding is economical. Low flow rate—only 10 cu. ft. or less per hour—means even more savings.

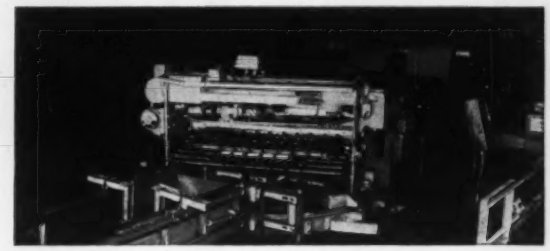
Call your nearest LINDE office today for a demonstration of this new Sigma ST-2 torch! Or write Dept. ST11, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

Linde TRADE-MARK

UNION CARBIDE

"Linde" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Cincinnati® Shear swivels for mitre cuts at Budd



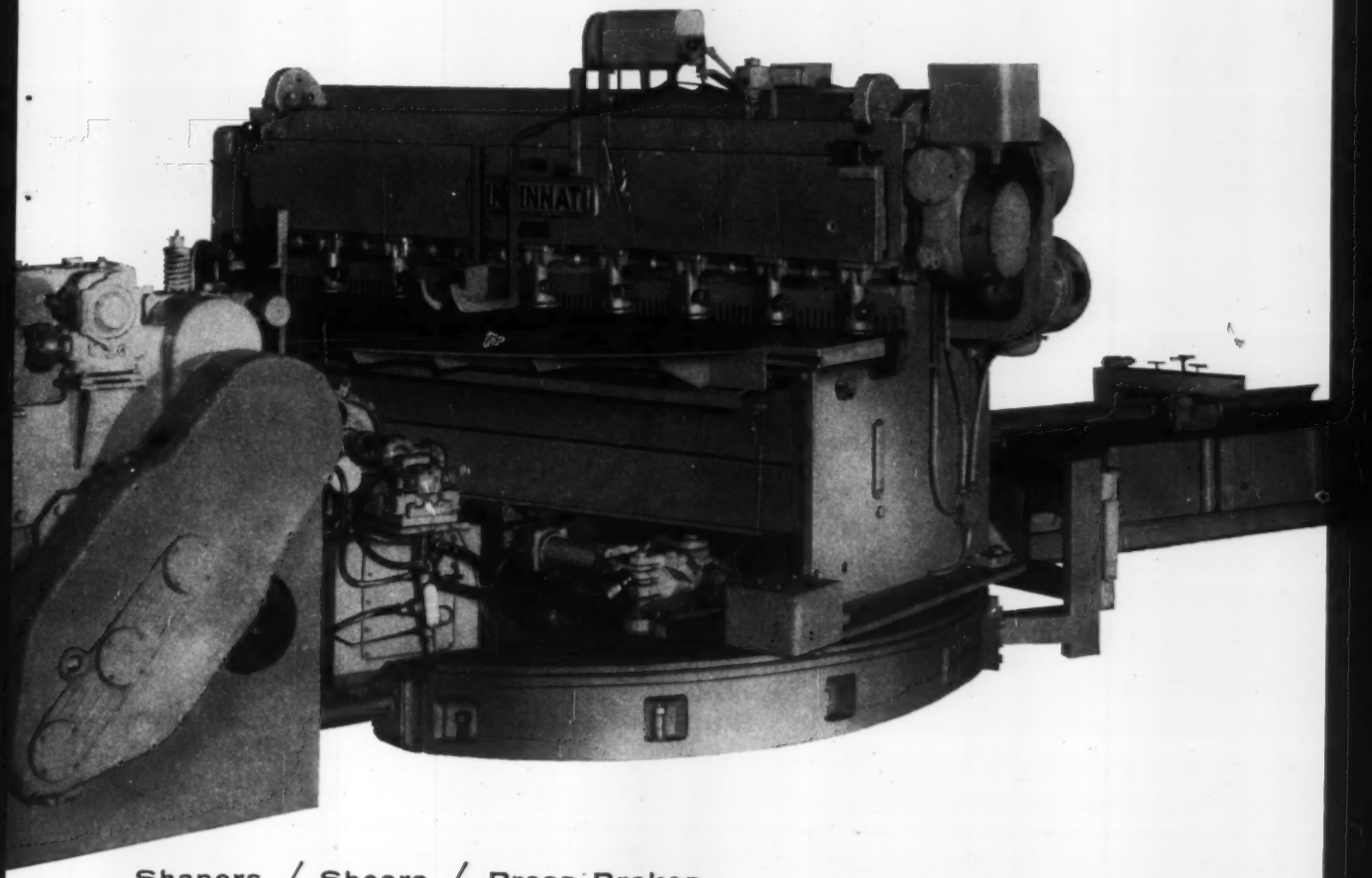
This Cincinnati® Shear is an integral part of an automatic decoil and shear line at The Budd Company's Gary, Ind., plant. It is used for straight and mitre shearing of coil stock into sheets.

Mounted on a swiveling base, the shear can be rotated 22½° to either side of center, so the operator can pre-set the desired angle of cut.

Accuracy must be within ⅛" per 80" of feed. Sheet widths range from 24" to 72" and thickness from 21 to 16 gauge (.0349" to .0625"). Since the operation must be automatic and continuous to be economical, Cincinnati dependability is a vital asset.

This shear was specially engineered for The Budd Company. However, most of its profitable features are available with standard Cincinnati® Shears. They include powerful hydraulic hold downs, all-steel interlocked construction, and one-clearance shearing of different metal thicknesses.

Complete details on Cincinnati® All-Steel Shears are included in Catalog S-7R. Write to Dept. C.

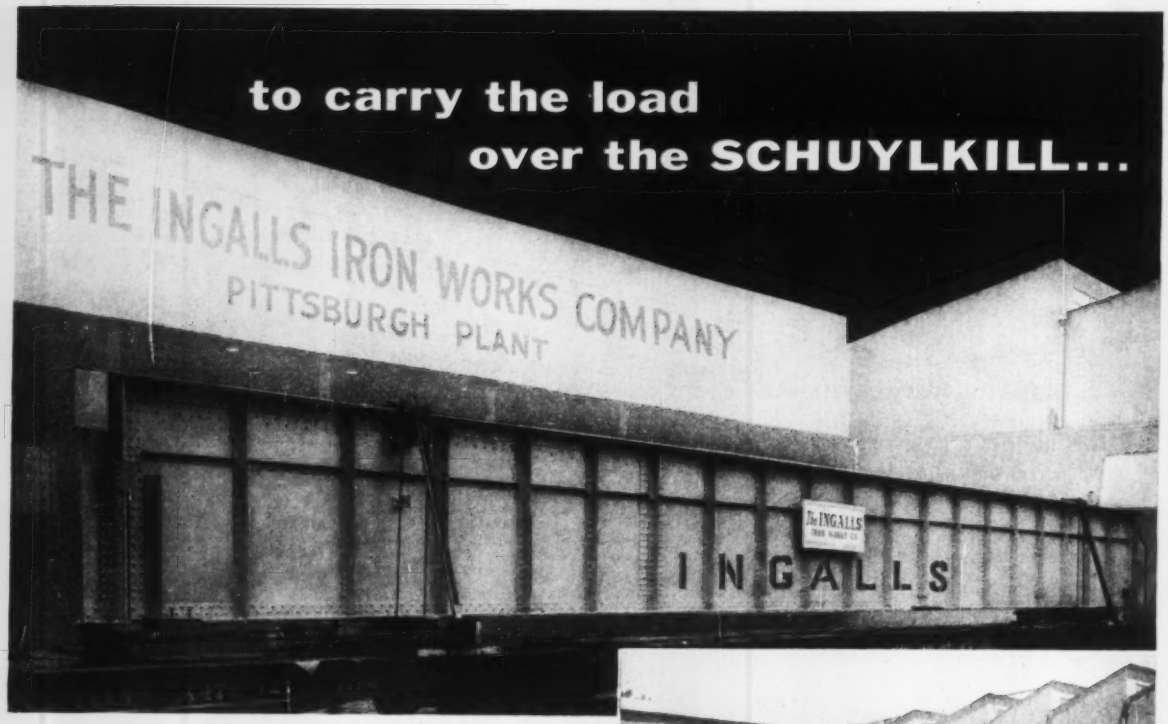


Shapers / Shears / Press Brakes

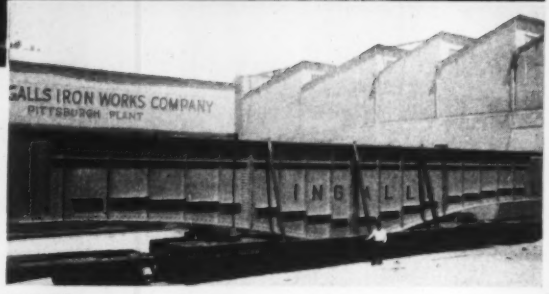
THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

to carry the load over the SCHUYLKILL...



112' 5" long—42.7 tons



100' 10" long—63.9 tons

steel girders fabricated by INGALLS

Massive and strong, twenty-one straight girders and eight haunch girders, each a triple load, are being precision-fabricated by The Ingalls Iron Works Company. These girders are for the Upper University Avenue steel bridge which will carry the load over the Schuylkill River at Philadelphia.

Ingalls is also supplying the cross girders, stringers and other fabricated steel required for this job—a total of more than 3,800 tons —to Kaufman Construction Company, the bridge builders.

Careful attention to detail . . . precise fabrication . . . and delivery as required have made Ingalls' skill in fabrication well-known in every state.

To get the best in fabricated structural steel, let Ingalls estimate your next job now.

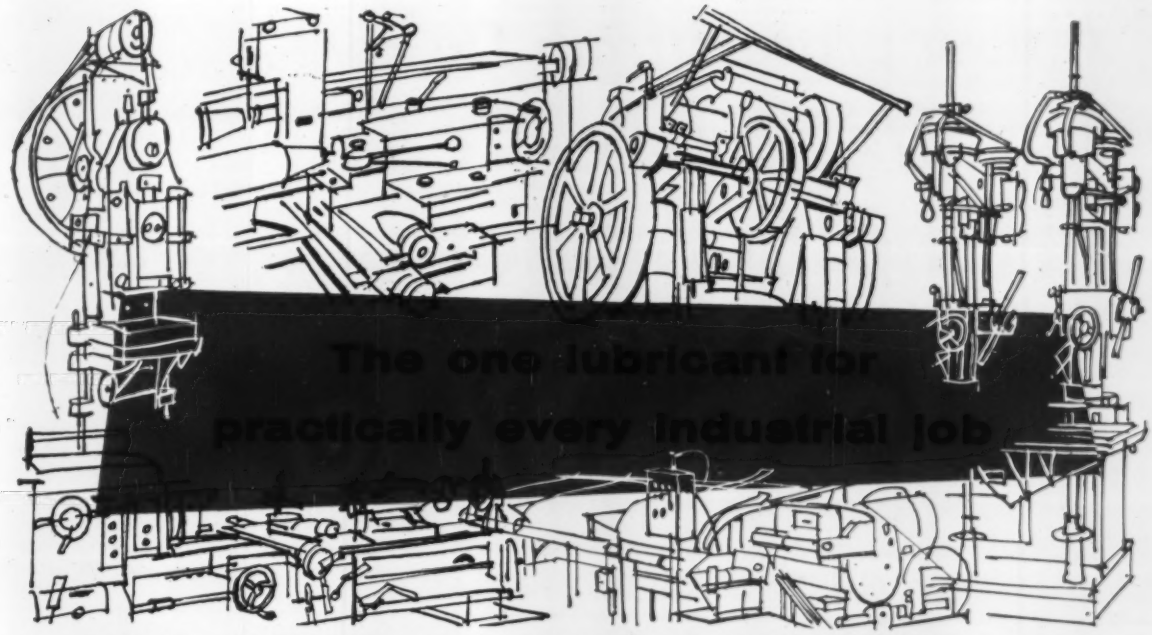
THE
INGALLS
IRON WORKS
COMPANY
Executive Offices
BIRMINGHAM, ALABAMA

STEEL PLATE FABRICATORS ASSOCIATION FOUNDED 1933

AISC AMERICAN INSTITUTE OF STEEL CONSTRUCTION FOUNDED 1921

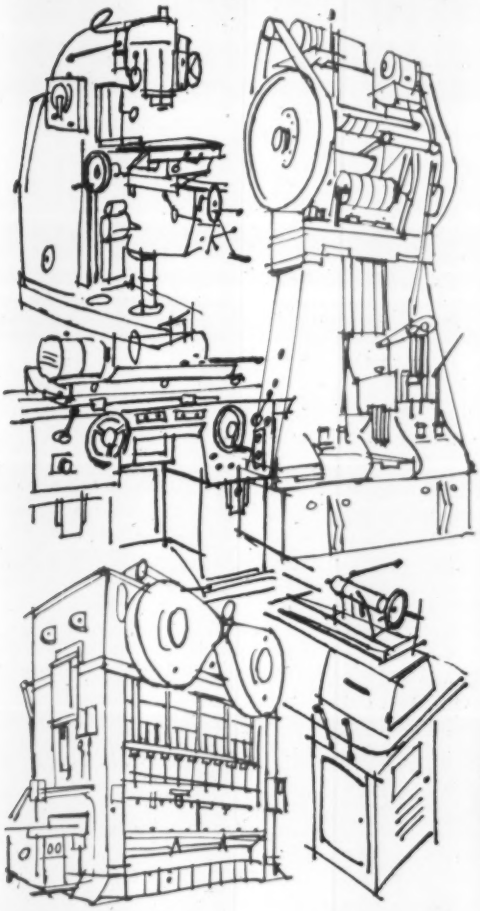
INGALLS INDUSTRIES ARE:

The Ingalls Iron Works Company, Sales Offices: New York, Pittsburgh, Chicago, Houston, New Orleans, Atlanta • **The Ingalls Steel Construction Company,** Sales Offices: New York, Chicago, New Orleans, Pittsburgh, Houston, Atlanta • **Birmingham Tank Company,** Sales Offices: New York, Pittsburgh, Chicago, Atlanta, New Orleans, Pascagoula
The Ingalls Shipbuilding Corporation, Shipyards: Pascagoula, Mississippi; Decatur, Alabama Sales Offices: New York, Chicago, Washington, Houston, New Orleans, Atlanta



ATLANTIC LUBRICANT 54

Performs on all types of grease-lubricated machinery • Cuts cost • Reduces lubricating errors



Atlantic Lubricant 54—an outstanding multi-purpose lubricant—assures:

- **Wider application**—almost universal application to grease-lubricated equipment in plants of all sizes
- **Excellent performance** at very high to extremely low operating temperatures
- **Reduced losses** from lubricating error
- **Lower costs** of warehousing and handling
- **Outstanding rust protection** for all ferrous surfaces
- **Unusual stability** against oxidation and softening—even under very rugged conditions
- **Easy, positive identification**—thanks to Atlantic Lubricant 54's distinctive purple color

Available from conveniently located warehouses. Call any of the Atlantic offices listed below.

ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

PHILADELPHIA, PA.
260 So. Broad St.

PITTSBURGH, PA.
Chamber of Commerce Building

PROVIDENCE, R.I.
430 Hospital Trust Building

SYRACUSE, N.Y.
Salina and Genesee Streets

READING, PA.
First and Penn Avenues

CHARLOTTE, N.C.
1112 South Boulevard

In South America
Atlantic Refining Company of Brazil, Rio de Janeiro

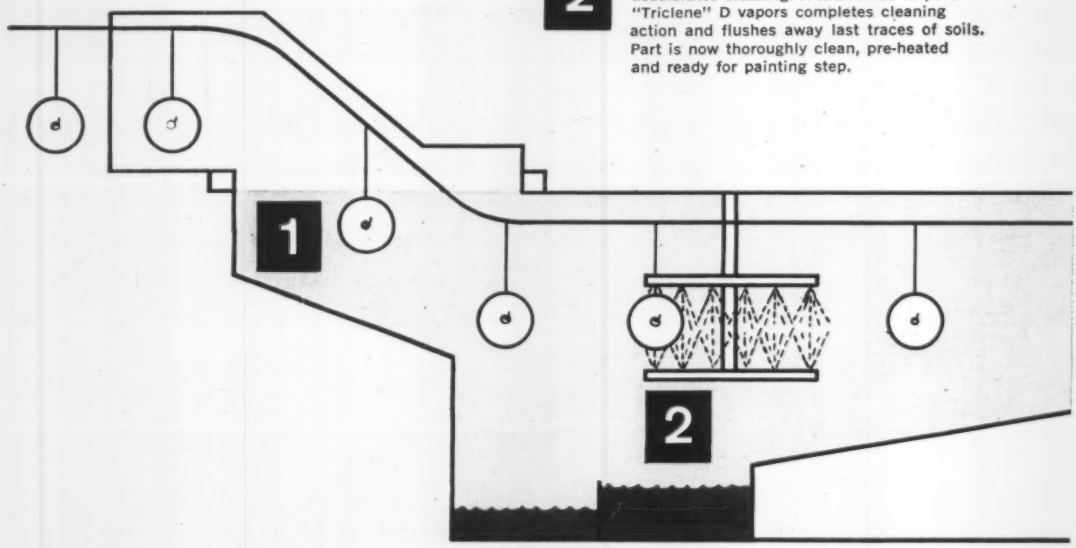
A new process from Du Pont...

Vapor degreasing and in one compact unit—with

HOW IT WORKS

1 Greasy and soiled pulley wheel (above) enters degreasing section of unit (No. 1 below) after prior fabricating steps. Cleaning action begins as "Triclene" D trichlorethylene vapors condense on cold part.

2 Mechanical action of spray rinse (No. 2 below) accelerates cleaning. A final rinse in pure "Triclene" D vapors completes cleaning action and flushes away last traces of soils. Part is now thoroughly clean, pre-heated and ready for painting step.



Here are the advantages...

SAFE: New process uses paints thinned with non-flammable "Triclene" D solvent. Fire and explosion hazard virtually eliminated!

CUTS COSTS: Solvent, overspray and excess paint are fully recovered—drip loss is eliminated. Integrated cleaning and painting with "Triclene" D trichlorethylene cuts labor and utility costs.

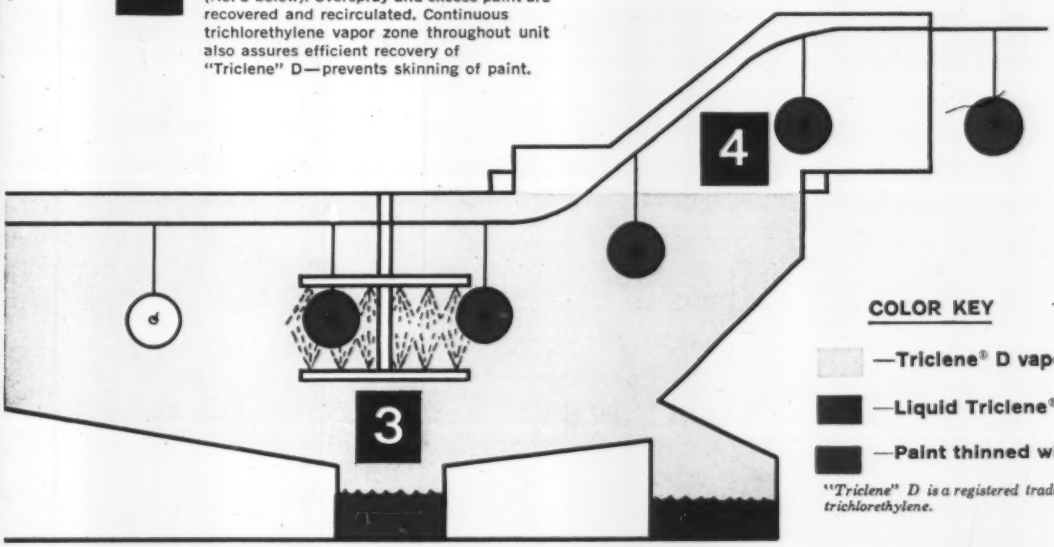
ONE COMPACT UNIT: Simplified equipment saves floor space and reduces finishing time. Unit can be easily adapted to fit in with other production steps both before and after cleaning/painting.

LOW INVESTMENT: No drip pans or spray booths needed. Drying ovens can be eliminated or requirements minimized.

nonflammable painting Triclene® D trichlorethylene

3 Nonflammable paint thinned with "Triclene" D is "flowed" on the part (No. 3 below). Overspray and excess paint are recovered and recirculated. Continuous trichlorethylene vapor zone throughout unit also assures efficient recovery of "Triclene" D—prevents skinning of paint.

4 When lacquer type paints are used, parts emerge from unit (No. 4 below) completely dry and ready for final assembly or packaging. Where curing paints are used, baking can be attained with minimum time and equipment requirements.



"Triclene" D is a registered trademark for Du Pont trichlorethylene.

Technical Report available...

Du Pont has prepared a Technical Report describing its new process for integrated cleaning and painting. Included are cost comparisons to help you determine probable cost savings. Get a copy of this Report from your Du Pont representative or your distributor of "Triclene" D trichlorethylene. You can also write to Du Pont, Electrochemicals Dept., Wilmington, Del.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

DISTRICT AND SALES OFFICES:

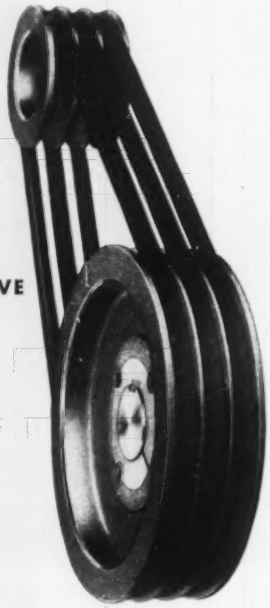
BALTIMORE • BOSTON • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND
DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • SAN FRANCISCO

Export Division, Du Pont Building, Wilmington 98, Delaware

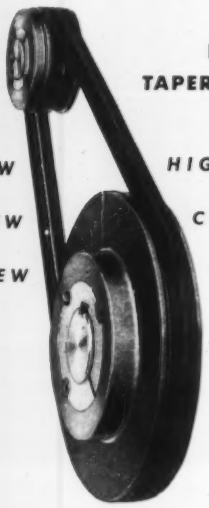
Announcing

an entirely new line of V-Belt Drives.....

DODGE Dyna V



CONVENTIONAL TAPER-LOCK DRIVE



DYNA-V TAPER-LOCK DRIVE

NEW **HIGH CAPACITY**

NEW **COMPACTNESS**

NEW **SAVINGS IN COST**

COMPARISON, ILLUSTRATED ABOVE — 3 HP, 1750 RPM, 2.41 TO 1 RATIO

	BELTS		SHEAVES			CENTER DISTANCE	HP	WEIGHT (LBS.)	COST	
	Number	Size	O.D. Driver	O.D. Driven	Width				Per hp	Per Drive
CONVENTIONAL TAPER-LOCK DRIVE	3	A42S	4.15"	8.95"	2½"	12.3"	4.62	24.7	$5.91	$27.38
DYNA-V TAPER-LOCK DRIVE	2	3V400	3.35"	8.00"	1$\frac{3}{32}$"	10.8"	5.0	18.0	$4.50	$22.50
% SAVING *Savings vary with different sized drives*			**19%**	**10%**	**56%**	**12%**	+	**27%**	**23.8%**	**17.8%**

Dyna-V Drives are sensationally compact. They are capable of handling up to three times as much horsepower in a given space. Dyna-V opens vast new possibilities for better, more economical machine design. And, in most instances, *Dyna-V costs less!*

Narrower grooves, to match stronger, narrower Dyna-V Belts, greatly reduce the face width and the weight of Dyna-V Sheaves. Cost is lowered. Smaller diameter sheaves and shorter center distances multiply savings.

Dyna-V Sheaves decrease shaft overhang—increase bearing life. The new dimensional stability of Dyna-V Belts solves the problem of belt matching. Every belt carries its full share of the load.

Dyna-V Drives will be available for capacities from 1 to 1500 hp. Ask your Dodge Distributor. Or write us for new Dyna-V Bulletin.

DODGE MANUFACTURING CORPORATION, 4400 Union St., Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

AMBALLOY... A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS

How Byers' metallurgical control program helps specialty steel users

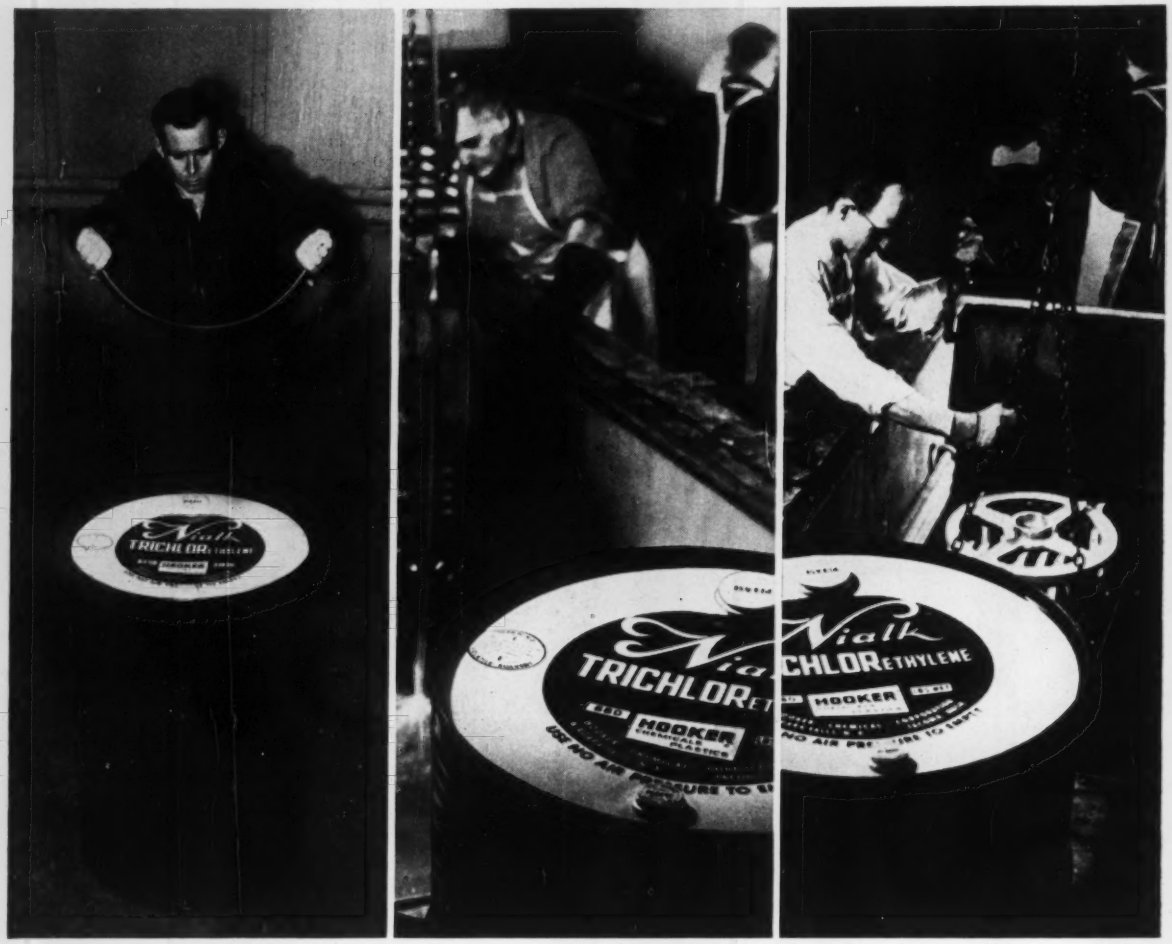
Quality-assurance provisions guard the uniformity, cleanliness and physical properties of Amballoy specialty steels. From raw material selection to delivery, a close-knit program of metallurgical control assures adherence to your most exacting requirements.

The entire Byers operation—size, personnel, furnace practice, laboratory analyses—has the flexibility required to follow through each heat, every step of the way. No once-over lightlies, ever.

We're talking about follow-through with magnetic particle inspection. Supersonic reflectoscope testing. Determination of inclusion content. Sampling. Quantitative expression of results. We're riding herd on quality—in this phase—and every other phase of our steel-making process.

You have every assurance that our high-grade specialty steels—alloy, stainless and carbon—will be tailor-made to *your* requirements. We'd like to talk with you about them. Call ATlantic 1-8110 or write: A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

Metallurgical control, every step of the way **A. M. BYERS COMPANY**



Now you can use

NIALK® TRICHLOR FOR BOTH FLUSHING AND VAPOR DEGREASING

Use just one grade of trichlor to flush missile and rocket parts and for vapor degreasing

The *metal degreasing grade* of Nialk trichlorethylene meets government and industry specifications for flushing missile and rocket components.

Its residue is a low 0.0005%. It also meets standard impact sensitivity requirements.

Cut your inventory The time and money savings of this new development are obvious. In just one area—your inventory—you can make substantial savings.

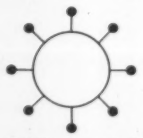
Eliminate mistakes There's no chance of picking the wrong drum now that you need only one grade of trichlor for both flushing and vapor degreasing.

No disposal problems Take the Nialk trichlor you use for flushing and in most cases you can use it in your vapor degreasing operation without distilling.

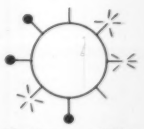
Data sheet For more information on this standard grade of Nialk trichlor, write for data sheet No. 814.

Remember—*only Nialk trichlor has* **psp.**

DOES YOUR SOLVENT SOUR?

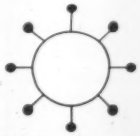


1. Trichlor is protected by stabilizer against heat, air, light, moisture, acids, and active metals.



2. Ordinary stabilizers wear out during use, making it necessary to titrate and add fresh stabilizer.

3. A sour solvent can even stain metals instead of cleaning them; affects bath operation, too.



Nialk has **psp** . . . permanent staying power. Always gives you full protection. Never goes sour.

HOOKER CHEMICAL CORPORATION
1201 UNION STREET, NIAGARA FALLS, N. Y.

Sales Offices: Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
In Canada: Hooker Chemicals Limited, North Vancouver, B.C.

HOOKER CHEMICALS PLASTICS

This beautiful sculpture appropriately named "Flight of Progress" by Robert Edward Hamilton, stands in the lobby of the Detroit offices of the Stainless and Strip Division of Jones & Laughlin Steel Corporation.

J&L STAINLESS STEEL ... THE METAL OF TOMORROW THAT'S FUNCTIONAL TODAY!

Improve your Products with . . .
J&L STEEL STAINLESS
SHEET • STRIP • BAR • WIRE

The combination of inherent physical and corrosion-resistant properties of Stainless Steel qualify it above all other metals for basic functional engineering application. Designers and engineers use it because of its high degree of efficiency. The ability of Stainless to fabricate readily into intricate designs, its high tensile strength, its resistance to distortion in extreme hot or cold applications plus its corrosion resistance add up to advantages no other commercial metal can offer.

It is recognized that the application of Stainless for engineering and product design is still in its infancy. The increasing use of J & L Stainless Steel in industry points to a future of broad scope. Many of the requirements for atomic energy, guided missiles, aircraft, turbine engines, and other advanced designs for the future depend upon the qualities that only Stainless Steel can offer.

The most modern and complete facilities in the industry make Jones & Laughlin your best source for consistent quality Stainless Steel. Our special metallurgical service insures complete satisfaction in the fabrication of your products.

Helpful data sheets and manuals are now available:
1. Laboratory Corrosion Data.
2. Data Sheets (please specify the grades in which you are interested).
3. Stainless Sheet and Strip Manual.

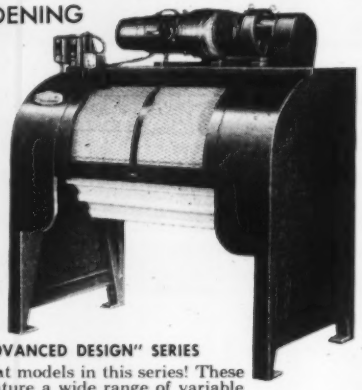
Write for your copy today.

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34

FOR DEBURRING • DESCALING • GRINDING • BURNISHING • POLISHING • FORMING RADII
MICROINCH FINISHING • RUST-INHIBITING • WORK-HARDENING

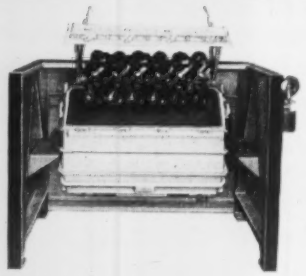
ALMCO

has the right barrel finishing equipment for you!



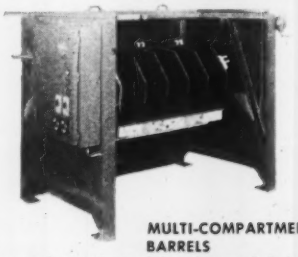
ALMCO'S "ADVANCED DESIGN" SERIES

Thirteen great models in this series! These machines feature a wide range of variable speeds (infinite from 6 to 30 r.p.m.), making possible economical deburring and finishing of the greatest variety of parts. Each unit has Almco's exclusive design features and rugged construction to stand up under all types of punishing applications.



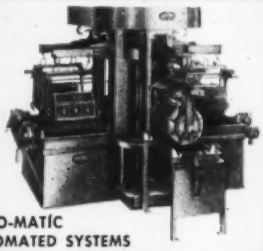
"FIXTURE" TYPE BARRELS

Pioneered by Almco for processing large and intricate parts. Custom designed fixtures hold parts securely, prevent part-on-part impingement and allow abrasive action to reach all surfaces, cavities, slots, etc. Barrels have automatic forward and reverse controls. Almco also offers integrated materials handling systems for further barrel finishing economies.



MULTI-COMPARTMENT BARRELS

Do you have these deburring and finishing problems — wide variety of parts or small quantity runs where fixtures would be too costly? Or short to medium cycle runs where you could *re-use* compound for several runs? Lack of floor space for several machines? An Almco custom-designed multi-compartment barrel may give you a cost-saving answer. Automatic forward and reverse. Any combination of compartments and doors.



SUB-O-MATIC AUTOMATED SYSTEMS

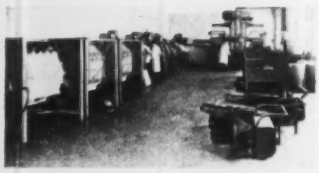
Almco's exclusive submerged unit is an automatic, "assembly line" system for micro-precision deburring and finishing of small parts in quantity. Saves labor, speeds up processing and flow of high production parts. One man for example can operate this equipment and handle as many as 192 barrel loads per 16 hr. day. Slashes compound expense to minimum because compounds can be re-used for days at a time. These submerged systems can also be obtained in non-automated, straight line systems.

CUSTOM-DESIGNED BARRELS

Almco designs and manufactures special barrels of all types for problems where standard equipment cannot be effectively used. These range from the smallest type to the largest fixture barrel such as the 60" diameter x 60" length barrel shown above. Special large diameter barrels with double flat or triple flat doors are also available to accommodate extra large parts and to allow abrasive media to flow freely over the outer periphery of the part. Your special problems may be solved with one of Almco's custom-designed barrels. Material handling systems can also be closely coordinated with special barrels.

SMALLER MACHINES

Twin barrel machines manufactured by Almco are the standard of the industry for shops processing small lots of parts and for companies with large lots of small parts. Also ideal for sample processing, barrel finishing research and development work, and as auxiliary equipment. These units are Almco engineered to the highest specification standards and include operational and safety features found on larger Almco machines.



YOUR SAMPLE PARTS PROCESSED without obligation in this modern Almco test lab! Simply write on letterhead for address of nearest Almco lab or send parts direct to Albert Lea, Minn. Enclose specifications desired. Complete free report includes recommendation. 52 PAGE BARREL FINISHING HANDBOOK SENT ON REQUEST.

Almco deburring and finishing machines are ruggedly constructed to perform on a round-the-clock basis. They incorporate the best engineering design required in the industry — your assurance of versatility and economical processing of work parts. Optional equipment includes material handling devices and systems, automatic forward and reverse, double or triple flat doors, single and dual timer controls for automatic delay starting and stopping, perforated drain doors for flushing and rinsing, unloading devices, etc. Also a full and complete line of Almco Supersheen barrel finishing compounds and media of all types made especially for use with Almco precision barrel finishing equipment.

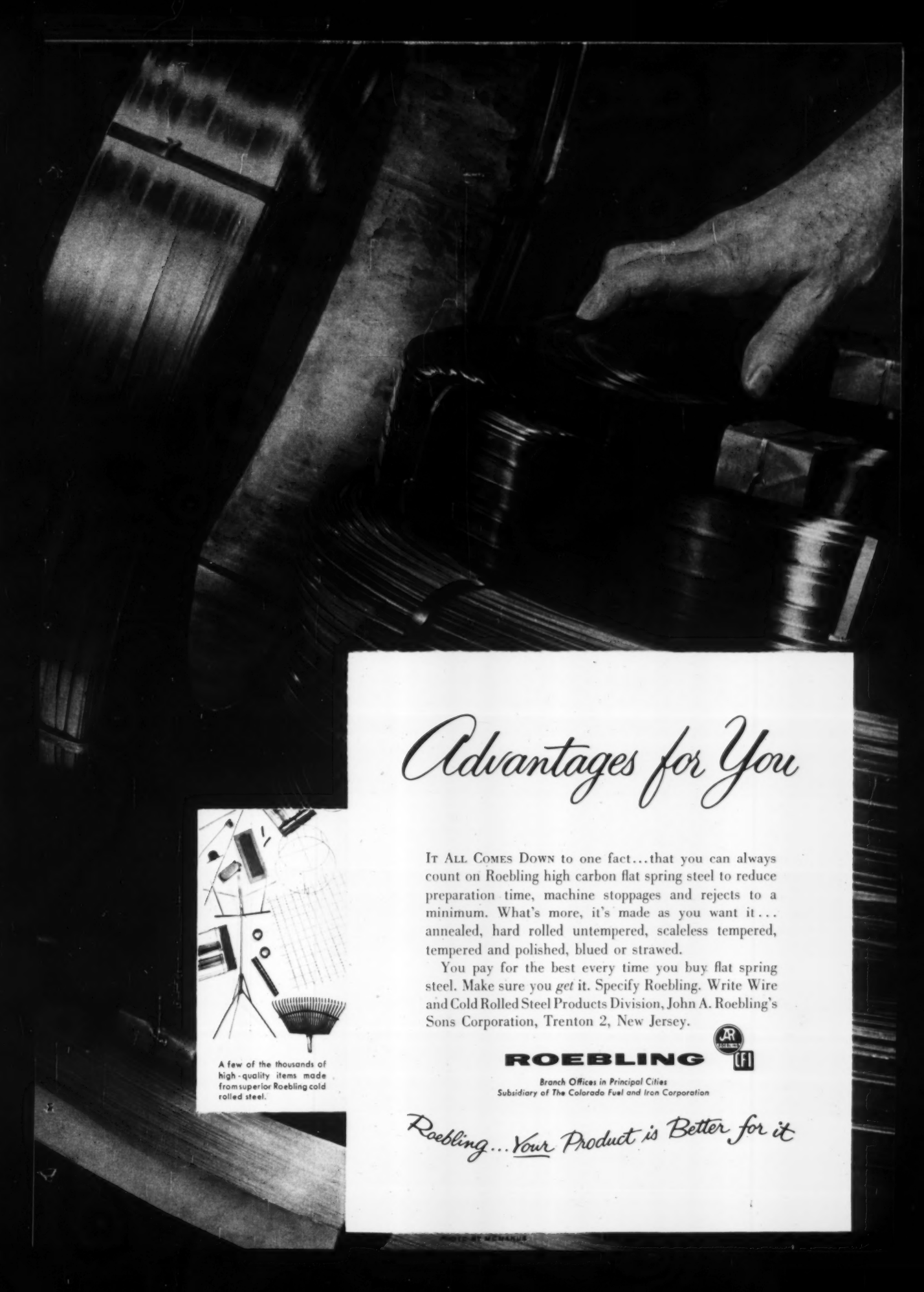
ALMCO

Queen Products Division • King-Seeley Corporation

151 E. Main St. • Albert Lea, Minnesota

Sales and Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.

Designers and Builders of all types of Barrel Finishing Equipment for the Metalworking Industry



Advantages for You

A few of the thousands of high-quality items made from superior Roebling cold rolled steel.

IT ALL COMES DOWN to one fact...that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered, scaleless tempered, tempered and polished, blued or strawed.

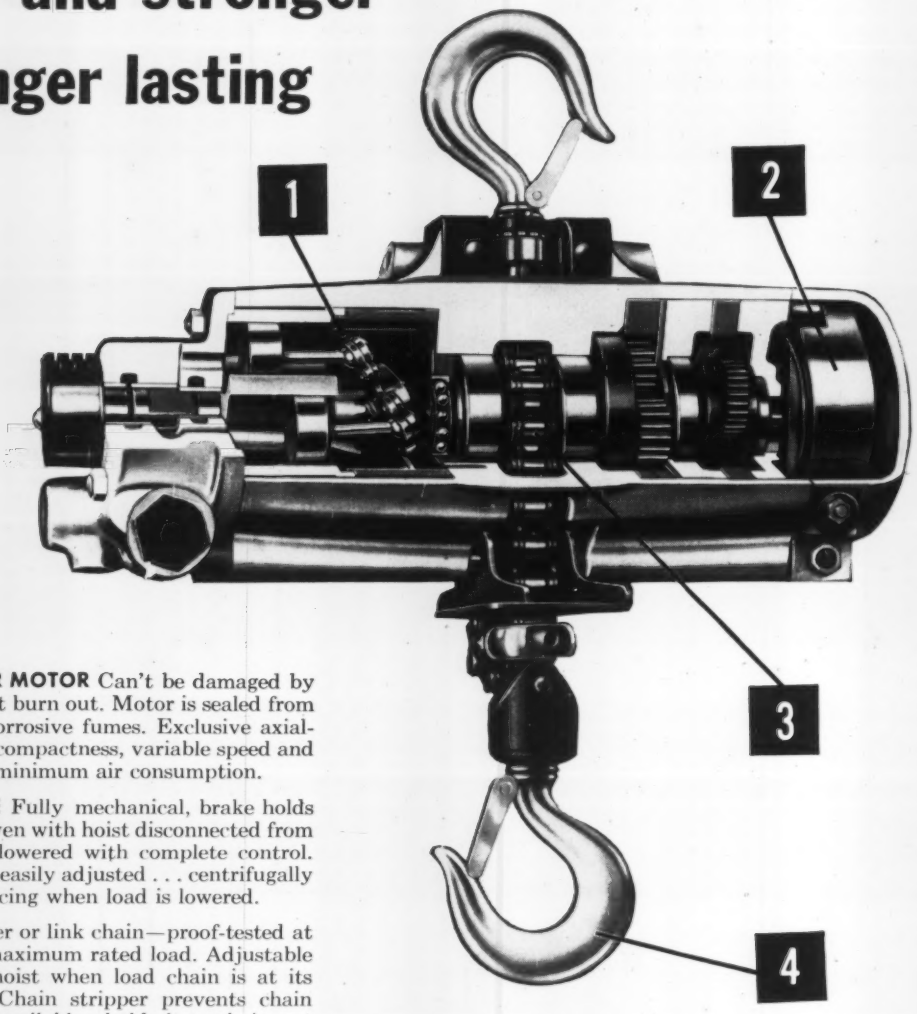
You pay for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

Why Gardner-Denver Air Hoists are safer and stronger —longer lasting



1. AXIAL-PISTON AIR MOTOR Can't be damaged by overload stalls . . . can't burn out. Motor is sealed from outside dirt, dust or corrosive fumes. Exclusive axial-piston design provides compactness, variable speed and maximum power with minimum air consumption.

2. POWERFUL BRAKE Fully mechanical, brake holds load in any position. Even with hoist disconnected from air line, load may be lowered with complete control. Brake is fully enclosed, easily adjusted . . . centrifugally governed to prevent racing when load is lowered.

3. LOAD CHAIN Roller or link chain—proof-tested at more than two times maximum rated load. Adjustable safety stops shut off hoist when load chain is at its maximum safe limit. Chain stripper prevents chain fouling. Chain basket available—holds long chain out of the way.

4. SAFETY HOOK Made of forged steel . . . ball-bearing-mounted for swiveling to accommodate load in any position. Safety latch prevents load from slipping off hook. Provision for secondary safety cable in upper hook boss.

Get the lift and the power and the speed you need—with *built-in* safety. Choose from Gardner-Denver's wide variety of lightweight, easy-to-use pneumatic hoists. Write for Bulletin 86.

Model	Capacity	Speed	Weight	Hook to hook
86-2V40	4000 lb.	10 f.p.m.	100 lb.	23½ in.
86-2V20	2000 lb.	19 f.p.m.	78 lb.	19½ in.
86-2V10	1000 lb.	38 f.p.m.	78 lb.	19½ in.
86-1V10	1000 lb.	19 f.p.m.	28 lb.	14 in.
86-1V5A	500 lb.	38 f.p.m.	28 lb.	14 in.
86-1V3	300 lb.	80 f.p.m.	28 lb.	14 in.
86A-1	150 lb.	45 f.p.m.	14 lb.	.....

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

The *Mellowes* Co. puts KEYSTONE quality in a package

Unique lock washer merchandising wins customers . . . Keystone uniformity keeps them!

To sell lock washers, The Mellowes Co., Milwaukee, Wisconsin, puts them into new, functional "Job-Pak" packages and "Coin-Pak" rolls that reduce handling expenses, simplify counting and weighing, eliminate spilling and the mixing of sizes and permit speedier inventories.

To keep their customers "sold," The Mellowes Co. specifies Keystone Lock Washer Wire. This forward-looking firm makes 250 sizes of helical spring lock washers out of Keystone Wire. Here are some of the reasons why The Mellowes Co. prefers Keystone Wire:

- Uniform diameter assures accurate dimensions when cold rolled into lock washer wire.
- Uniform structure completely spheriodized for easy coiling and close control of inside and outside diameters.
- Uniform chemical analysis and grain size provides consistent hardness in heat treating.

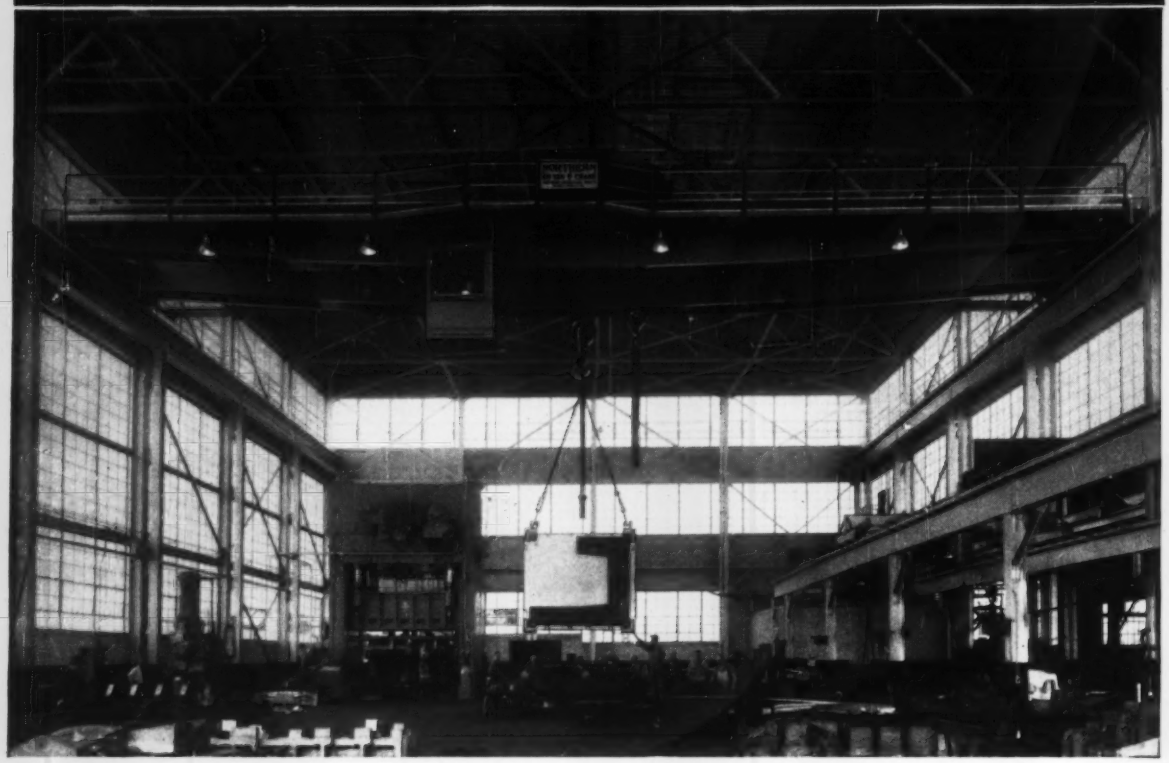
The Keystone research metallurgists worked hand-in-hand with The Mellowes Co. to develop a special quality of wire for the manufacture of lock washers. The result has been a quality product manufactured at the lowest possible cost.

Your Keystone Wire Specialist and the facilities of our metallurgical department are at your service. Call us today to help solve your wire problems.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE WIRE FOR INDUSTRY

Look Overhead... see "NORTHERN"



Versatility—when and where you need it!

LOCATION

In an automotive industry tool and die shop.

SPAN

84-feet, centers of runways

CAPACITY

40 tons on main hook—
10 tons on auxiliary hook

Overhead material handling in an automotive tool and die shop requires maximum versatility and fine control. The overhead crane may be called upon to spot a heavy duty press for try-out; to handle heavy body or chassis dies; and to move lighter, miscellaneous dies. Fast, safe precision handling for all such tooling is essential to cooperate with customers' requirements.

The NORTHERN Crane shown was installed in a heavy die shop. It provides flexibility, saves time, facilitates try-out, and is convincing that this shop is equipped to handle big responsibilities in a big way!

NORTHERN Hi-Lift Cranes — up to 20 tons — and NORTHERN Super Cranes — up to 150 tons — and up to 125 feet in span, provide a wide range of choice, and versatility when and where you need it.

Please consult with us before you invest in overhead cranes and hoists.

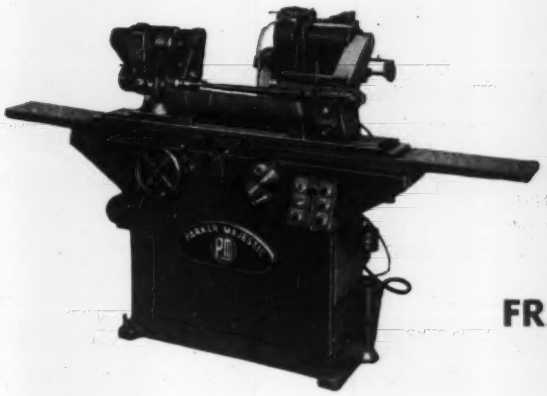
NORTHERN MATERIAL HANDLING EQUIPMENT

NORTHERN ENGINEERING WORKS
210 CHENE ST. • DETROIT 7, MICH.

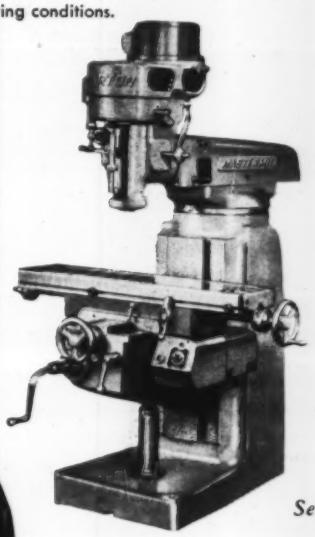
Need Infinite Speed Adjustment—Accurate Control?

Get Both with DYNAMIC®

FRACTIONAL HORSEPOWER AJUSTO-SPEDE® DRIVES



Parker Majestic No. 2 Universal Grinder is equipped with two Ajusto-Spede Drives. One drive, mounted on the headstock, rotates the work against the grinding wheel. Another drive operates the table feed. Both work speed and table speed are infinitely adjustable to suit varying conditions.



A Dynamatic Ajusto-Spede Drive provides infinitely adjustable table feed speeds on a Gorton Mastermil. Stepless adjustment permits the operator to select the proper table speed for maximum efficiency in machining all metals.

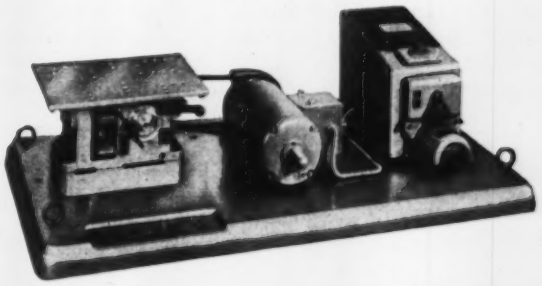
Wherever infinite adjustment and accurate control of speed are required for proper machine operation, satisfied users are realizing improved machine performance and product quality through the use of Dynamatic Ajusto-Spede Drives. Stepless adjustment from zero to full output speed, and accurate control of any speed within the range, permit operation at the exact speeds required.

Ajusto-Spede Drives operate on standard 115/220 volt alternating current, requiring no special power source. The compact drive with its integral control system needs no wall space, and requires little space on the driven machine. These drives may be mounted in any position, providing great versatility of application. Twelve models are available in ratings from ¼ hp at 1650 rpm through 1 hp at 3200 rpm.

Before you specify a fractional horsepower drive for your product or plant equipment, check the many advantages offered in the Dynamatic Ajusto-Spede Drive.

Send for Your Free Copy of Illustrated Bulletin FAS-6 which Describes Dynamatic Ajusto-Spede Drives

Harnischfeger Welding Positioner WP-1 uses an Ajusto-Spede Drive and gear reducer to rotate welding table. Table speeds are infinitely adjustable from zero rpm to 4.47 rpm. Drive tilts with table to the position desired by the operator.



Vibration Fatigue Testing Machine manufactured by the All American Tool and Mfg. Company employs an Ajusto-Spede Drive to operate a vibrating table at various speeds for testing instruments and electrical components.

EATON

EATON

DYNAMATIC DIVISION

MANUFACTURING COMPANY

3307 FOURTEENTH AVENUE • KENOSHA, WISCONSIN

Man's Eternal Struggle with the Machine

BUSINESS IS UNUSUALLY COMPETITIVE TODAY AS OPERATING COSTS ARE RISING AND PROFITS SHRINKING

Did you ever meet a vendor who wouldn't sell you the equipment you wanted?

Just "meeting" such a vendor is not enough.

If you haven't *always had* vendors who refuse to supply unsuitable equipment, you've been getting something you don't need.

If you haven't *always had* vendors who are dedicated to advancing your manufacturing technology, you're getting less than you *must* have.

Your responsibility for devising production processes and selecting equipment is greater than ever. You no longer have time to "hand-feed" any equipment builder's design and manufacturing operations.

Yet, you can't afford to install anything other than what is right. Because, if your production methods aren't keeping pace with your competitors', you're already starting to go out of business.

Sciaky knows these facts of business life. To Sciaky, it is obvious that the cost of always having to make *new sales to new customers* is far greater than the cost of a long term relationship of trust based on fulfilling your requirements. That's why Sciaky refuses to sell resistance welding and production equipment which is unsuitable for the user's needs.

Why take less than the full advantage of consulting with a Sciaky Application Engineer the next time you are considering equipment. No obligation, of course.

Many manufacturers are taking that advantage. As a result, men just like you are enjoying the full vendor support necessary to steadily improving their company's manufacturing operations. When Sciaky analysis of their requirements sometimes indicates that Sciaky equipment is not suitable, the recommendation for "no change" is immediate. Thus, Sciaky builds the foundation of trust necessary to your success.

The bulletin, "Resistance Welding At Work" contains many factual descriptions of interesting applications of the Sciaky technique. Write and advise of your field of interest.

SCIAKY

67A

SCIAKY BROS., INC., 4909 W. 67th STREET, CHICAGO 38, ILLINOIS • POrtsmouth 7-5600

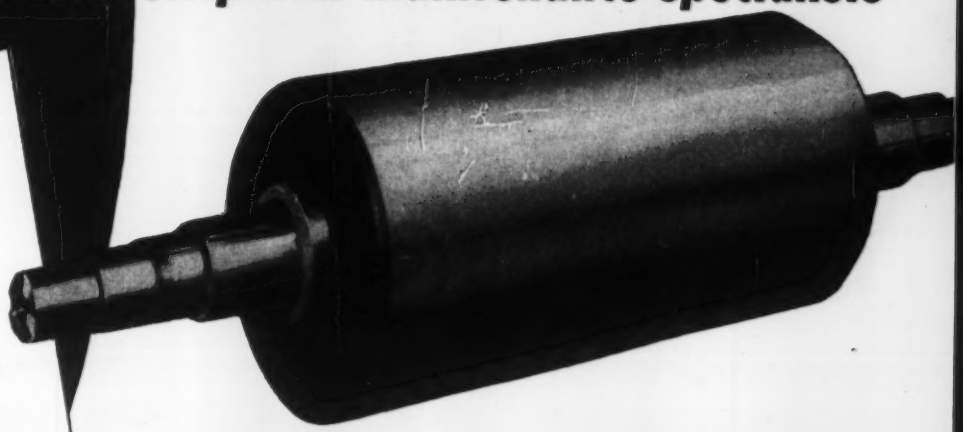
right answers to your Roll problems

NGSTOWN"

hot and cold strip mill maintenance specialists

Q. How can scratching, galling, pickup, and excess wear be eliminated?

A. Use PARALLOY... the Rolls of uniform hardness all through. Roll more tonnage from new to scrap diameter.

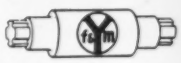


PARALLOY

HOT STRIP COILER ROLLS • COILER PINCH ROLLS
PICKLING LINE PINCH ROLLS • UPCOILER ROLLS
CLEANING LINE PINCH ROLLS • SINKER ROLLS
CARRIER ROLLS • TEMPER MILL TENSION ROLLS

Q. How can heat check, warpage and cracking be overcome?

A. Let Youngstown's proven experience with Ductile Cast Iron help you in the applications at right.



DUCTILE IRON

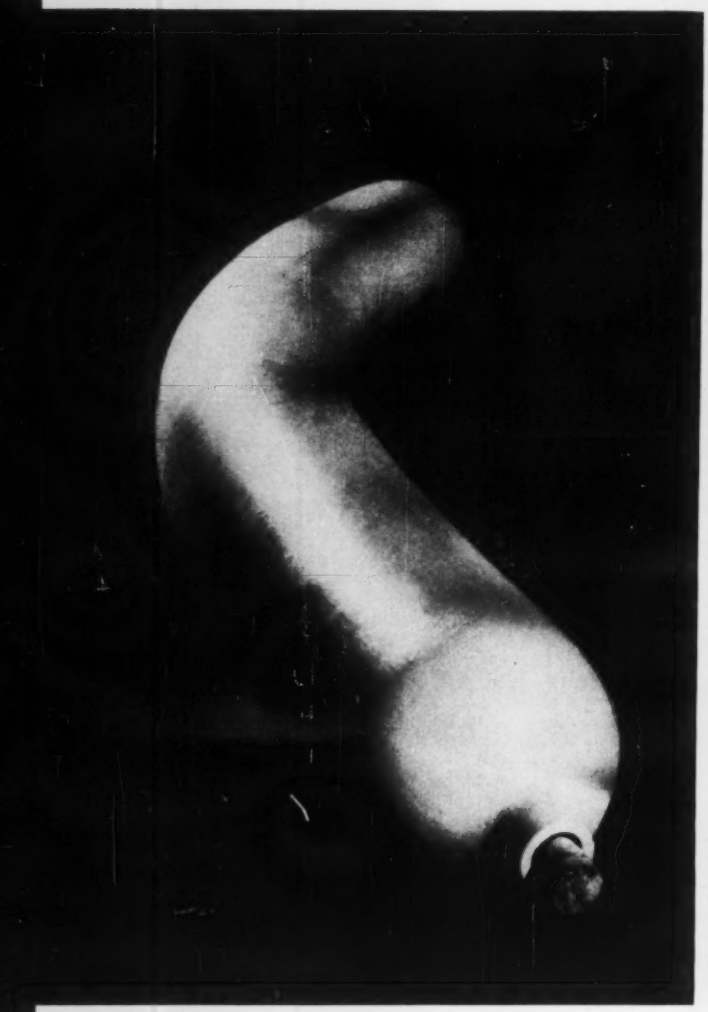
RUNOUT TABLE ROLLS • HOLDING TABLE ROLLS
LOOPER TABLE ROLLS
LOOPER TABLES • APRON PLATES

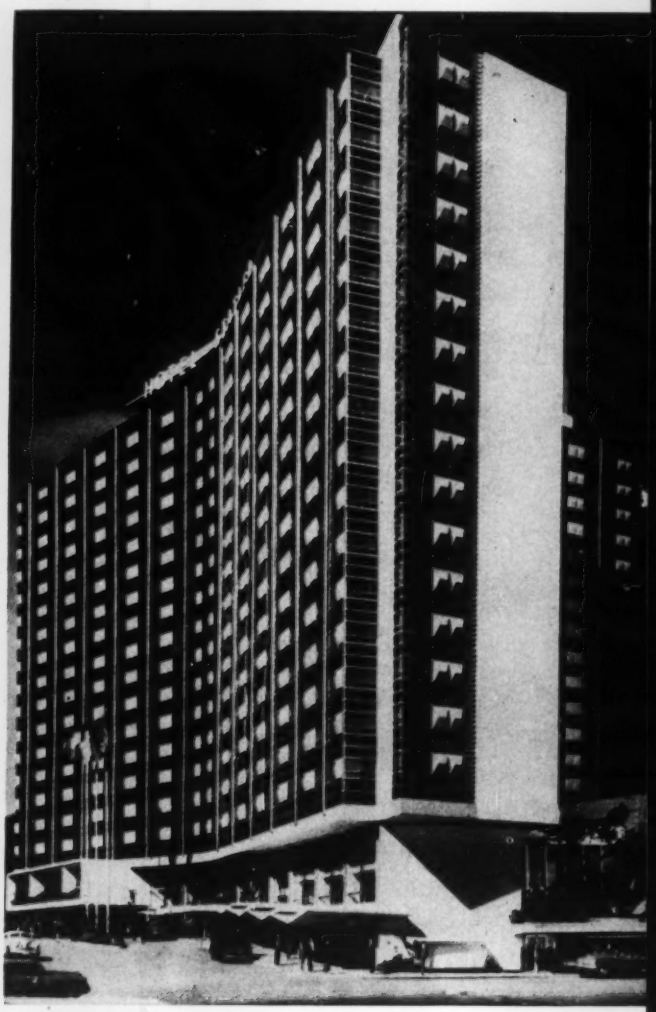
Ductile Cast Iron Rolls are reducing maintenance in hot strip mills . . . especially good under the sprays. We invite your inquiries on rolls or any other ductile iron castings up to 50,000 pounds.

The Youngstown Foundry & Machine Co.

Youngstown, Ohio

HOW THEY BUILT IT BETTER with USS National





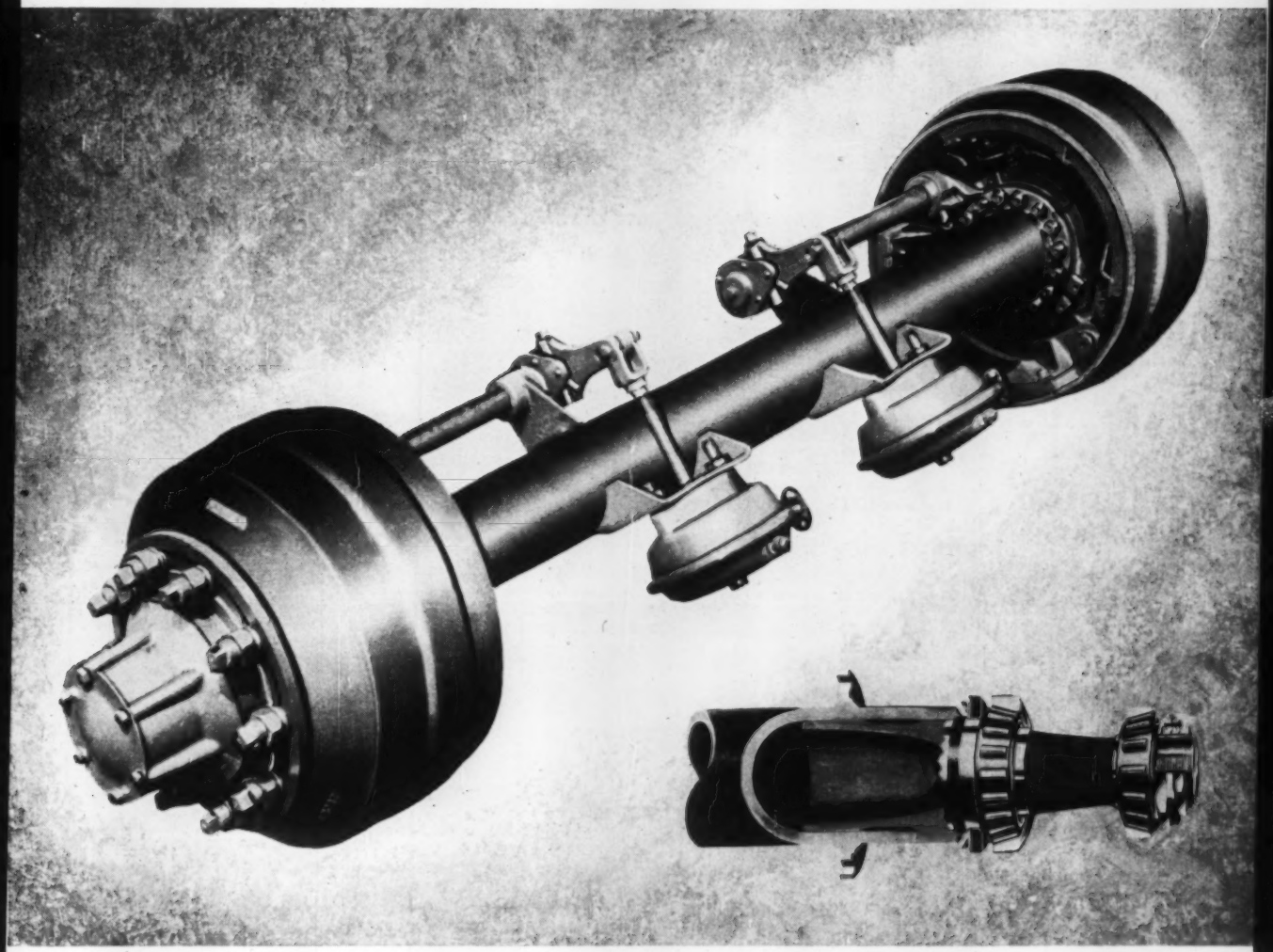
OXYGEN CYLINDERS FOR SUBS—These USS National Seamless Steel Cylinders are curved to match the hull contours of the Navy's new, atomic-powered submarines. Specifically shaped to utilize every cubic inch of space in the undersea craft, the cylinders store highly compressed oxygen vital to the crew during extended underwater cruises. National Seamless Steel Cylinders are pierced from solid billets of the highest quality steel to give the utmost in strength, dependability, and uniform wall strength.

STATLER HILTON HOTEL—The 1,001 rooms of the Statler Hilton Hotel in Dallas, Texas are served by heating and air-conditioning systems composed of 65 tons of National Seamless Pipe. All of the steam piping, condenser water piping, and primary chilled water piping are National Seamless. Why National Seamless? Because it has the strength, dependability and uniformity of solid forgings—properties that keep any heavy-duty piping system structurally sound under adverse operating conditions.

Architect: W. B. Tabler, New York. Mechanical Engineers: Jaros, Baum & Bolles, New York. Plumbing and Heating Contractors: Brown & Olds, Dallas. General Contractors: R. E. McKee, Inc., Dallas.

"Walls Without Welds," a technicolor, sound film of the manufacture of National Seamless Pipe and Tubes, is available free of charge to industrial groups, clubs, school groups, etc. Write for information.

Seamless Steel Pipe and Tubes



LIGHTWEIGHT TRAILER AXLE—Standard Forge and Axle Co., Inc., of Montgomery, Alabama, puts strength, lightness and long spindle and bearing life into every axle they produce by using a manufacturing technique called the inserted spindle process. Specifically, heat-treated alloy steel spindles are hydraulically pressed into either end of a section of Shelby Seamless Mechanical Tubing. This process makes the axle lighter and extremely strong. Handling and grinding of spindle inserts is easier—tolerances are kept closer.

USS NATIONAL SEAMLESS PIPE AND TUBES might be just the materials you need to cut costs, increase strength, shock-absorbency and workability in your product. National Seamless is available in a complete range of diameters, wall thicknesses, various shapes and steel analyses. It won't cost you anything to find out. Write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. Or, for Shelby Seamless Tubing, contact your nearest Shelby Distributor.

USS, National, and Shelby are registered trademarks

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Supply Division • United States Steel Export Company, New York

Specify

SANDVIK

Precision-Tailored

Spring Steel

FOR ACCURATE FLATNESS, STRAIGHTNESS, WIDTH, GAUGE AND EDGE FINISH *PLUS* SPECIFIC PHYSICAL PROPERTIES

SS-138

When you require specific physical properties combined with accurate dimensions in spring steel, call Sandvik.

From composition, through processing to the finished strip, Sandvik has had long experience in precision-control. That is why you find Sandvik steels used for feeler gauges, watch springs, compressor valves, camera shutters, reeds, shock absorbers and many other exacting spring steel applications.

Sandvik supplies cold rolled specialty strip steels —

- **In special analyses for specific applications.**
- **Precision-rolled thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered — scaleless or polished bright, yellow or blue.**
- **With square, round or dressed edges.**

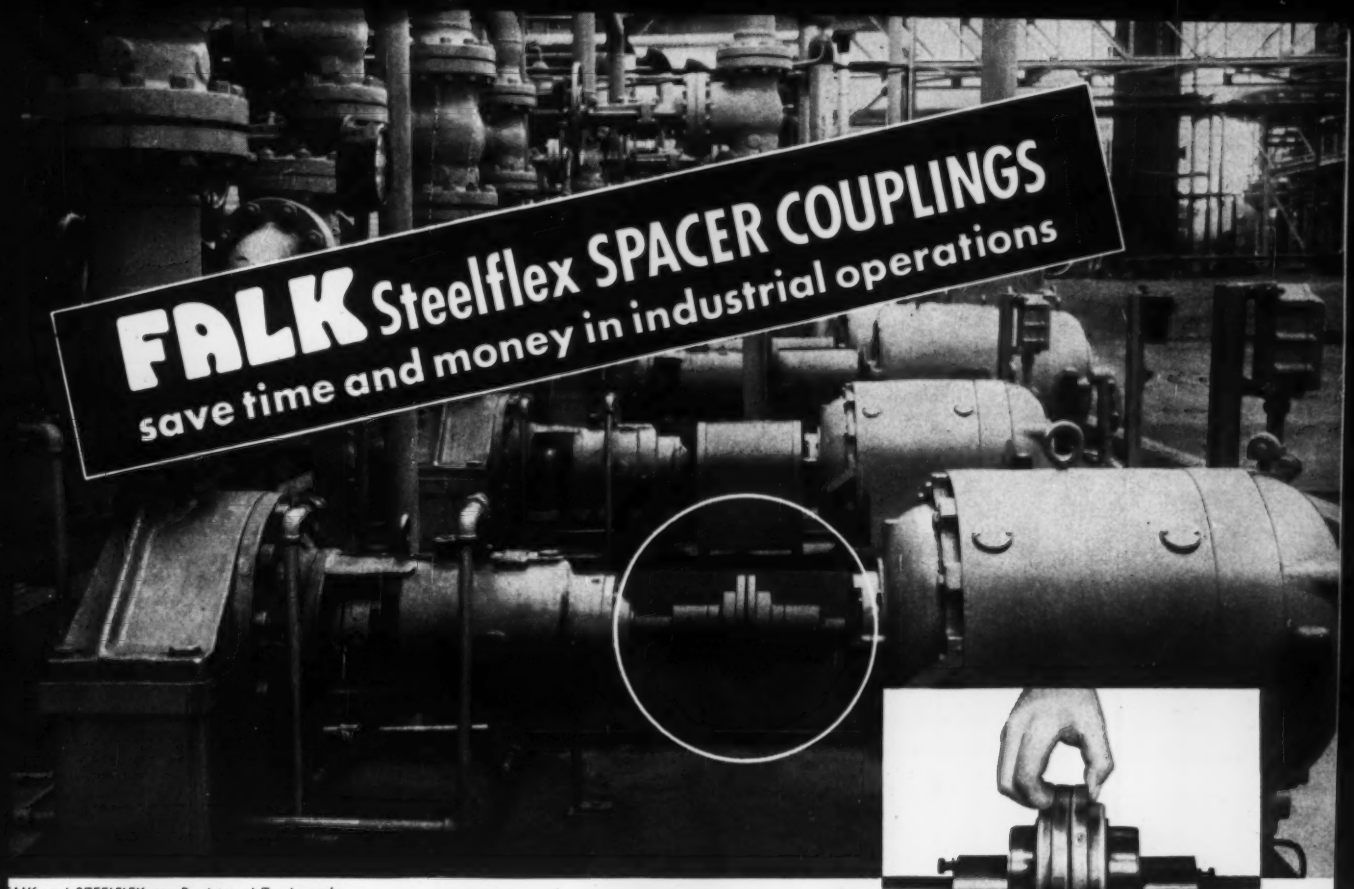
Sandvik stocks a wide variety of qualities and sizes. In addition Sandvik has Rolling, Slitting, Edge-Filing and Hardening and Tempering facilities.

NEW, FREE BROCHURE

Gives Specific Data On Sandvik Cold Rolled and Hardened and Tempered Strip Steels. Catalogs leading types by application and lists finish, usual size range and chemistry. Send for your copy today.

SANDVIK STEEL, INC.
1702 Nevins Road, Fair Lawn, New Jersey
Tel. SWarthmore 7-6200
In N. Y. C. ALgonquin 5-2200
Warehouses: Fair Lawn, N. J. • Cleveland • Los Angeles
Branch Offices: Cleveland • Detroit • Chicago • Los Angeles
SANDVIK CANADIAN LTD. P. O. Drawer 1335 Sta. O., Montreal 9, P. Q.
WORKS: Sandviken, Sweden

Sandvik
Quality Steels



FALK Steelflex SPACER COUPLINGS
save time and money in industrial operations

FALK and STEELFLEX are Registered Trademarks

Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal *without disturbing the driving or driven unit.* This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts *without the usual loss of operating temperature!*

And still another: you can remove or reinstall the FALK Spacer as a unit *without draining the lubricant.*

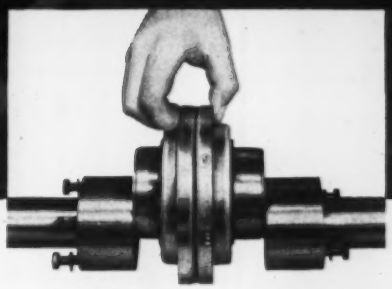
Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) *both.* Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities.

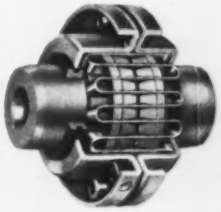


EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

To disconnect, reverse the second step. No draining of lubricant necessary.



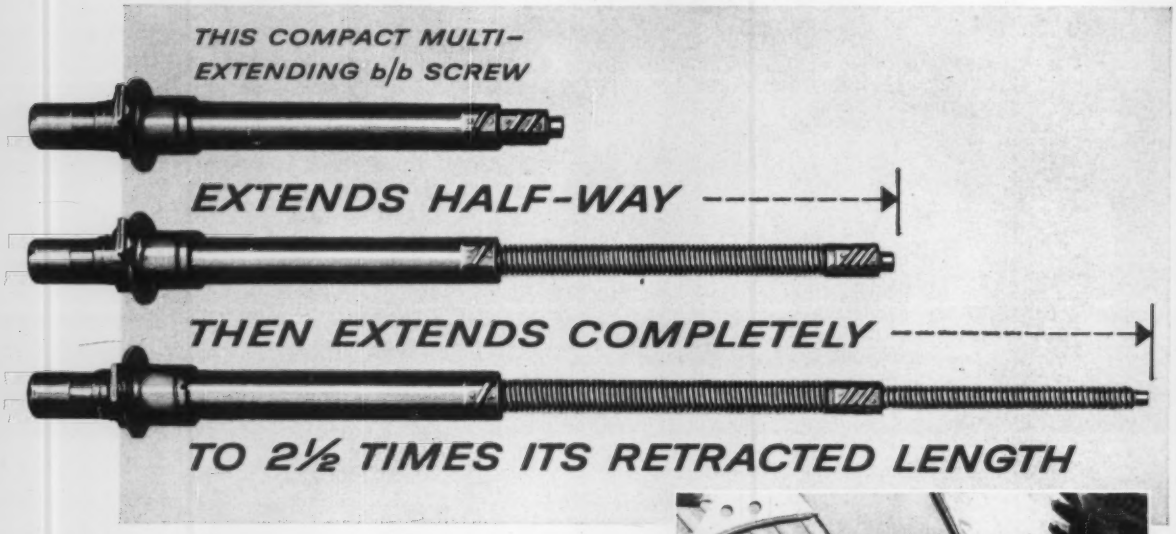
The heart of the FALK Spacer ...the basic Type F Steelflex

Write for Service Manual 4838

FALK

...a good name in industry

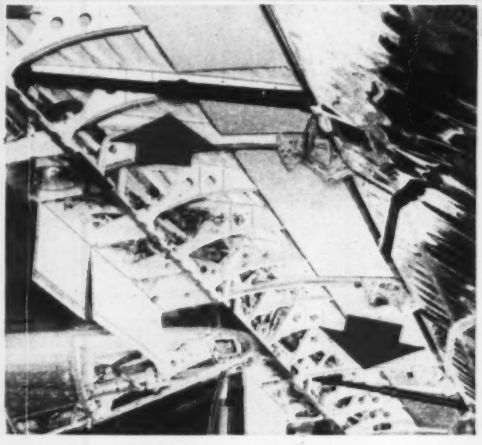
FAR-REACHING EXTENSION FROM LIMITED ACTUATOR SPACE



Now Saginaw supplies the answer to your most difficult actuator space problems with the Multi-Extending Saginaw Screw! Utilizing Saginaw's time-proved *recirculating ball* principle in multiple telescoping sections, the Multi-Extending b/b Screw conquers actuator space obstacles designers have been seeking to overcome for years! Here's why:

1. **UNIT EXTENDS** in a ratio of 2.5 to 1, providing maximum extension 2½ times the length of the retracted screw.
2. **FAR GREATER LOAD CAPACITY** than any other telescoping device in its class.
3. **FAR MORE PRACTICAL AND TROUBLE-FREE** than other telescoping units on the market.
4. **PRECISE, DEPENDABLE POSITIONING** and control within thousandths of an inch.

• OVER 90% EFFICIENCY • REQUIRES UP TO 4/5 LESS TORQUE than acme screws • LESS DRAIN on power supply • CONSERVES SPACE AND WEIGHT • OPERATES DEPENDABLY at extreme temperatures • PERFECT FUNCTIONING with only initial lubrication



USED ON THE COUNTRY'S MOST MODERN AIRCRAFT—Multi-Extending b/b Screw wing flap actuators being installed on the new Lockheed Electra.

The Saginaw Multi-Extending Screw is also used to actuate speed brakes, afterburners, variable air inlets, canopies and similar critical components on today's newest aircraft.

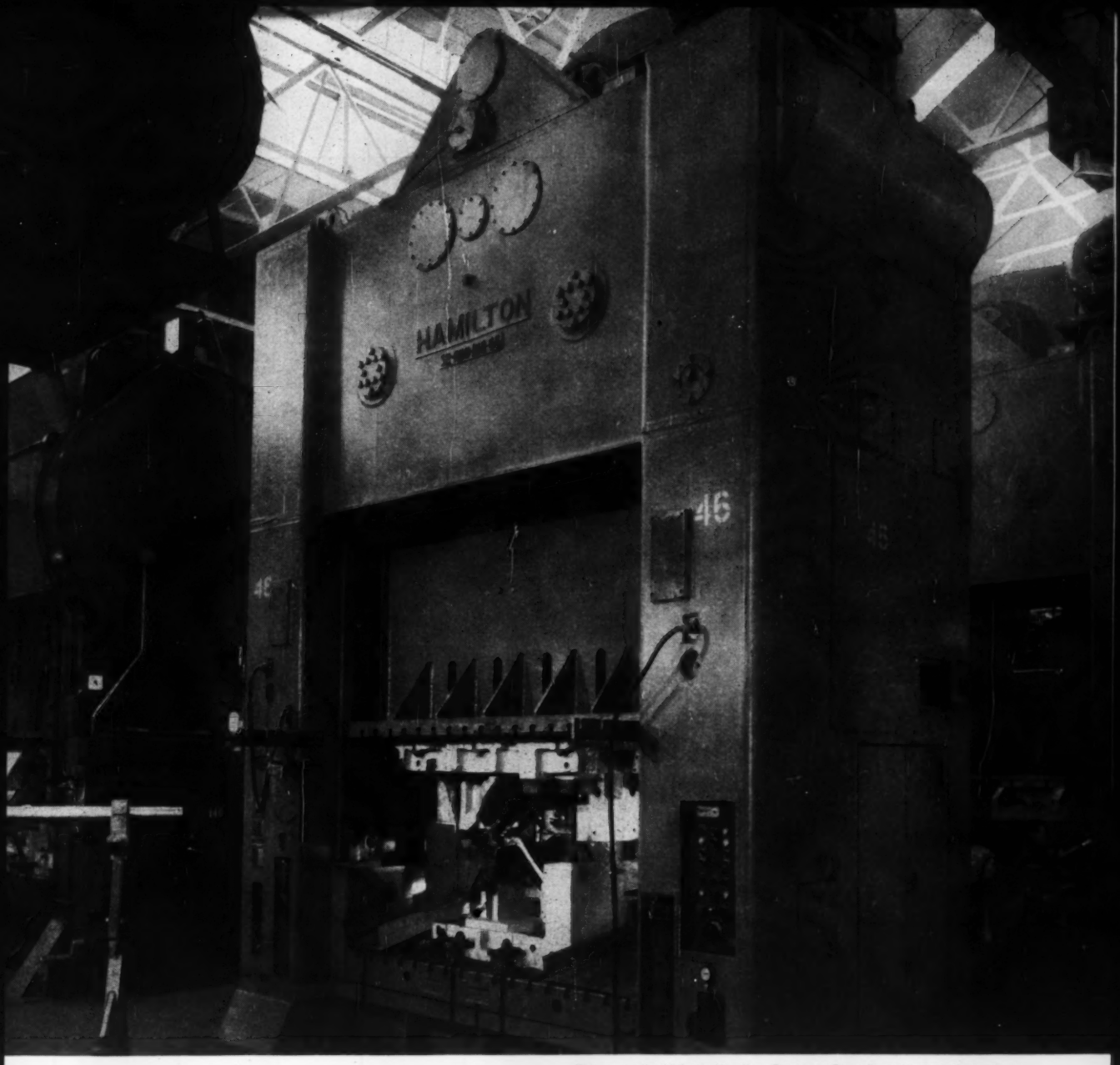
Send today for the new 1959 engineering data book on Saginaw b/b Screws and Splines... or see our section in Sweet's Product Design File.

Saginaw

WORLD'S MOST EFFICIENT ACTUATION DEVICE

ball bearing Screw

SAGINAW STEERING GEAR DIVISION, GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN



This versatile 600-ton Hamilton Eccentric Gear Press is currently turning out a wide variety of parts in a major automobile plant in Detroit.

Why an eccentric gear press?

Hamilton Eccentric Gear Presses are ideally suited for heavy duty operations—particularly deep draws and other stamping operations where the tonnage is encountered well up on the stroke.

The eccentric and gear are integral and rotate on a short eccentric pin, as a result of which torsional and bending loads are negligible.

The many added features of Hamilton Eccentric Gear Presses guarantee greater production, improved stamping quality, and lower maintenance costs.

Write to Dept. 1-A for Bulletin #13301, describing these machines

Hamilton Division Hamilton, Ohio

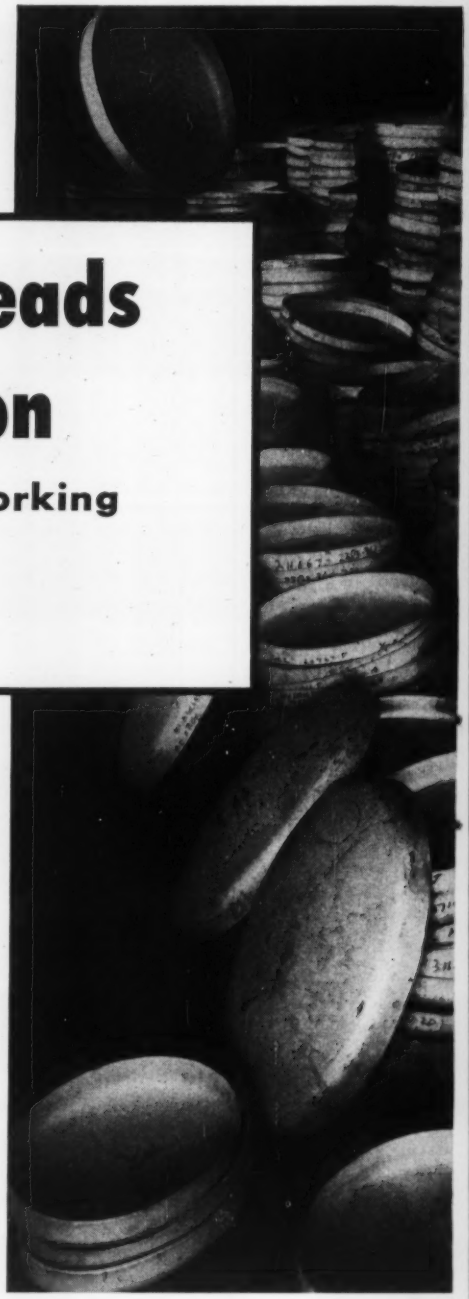
BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

BALDWIN BLH LIMA-HAMILTON

Stainless Steel Heads stocked by Carlson

- keep your working capital working
- save you money
- give you prompt delivery



It pays to design and build equipment with this stock in mind. You don't have to tie up your working capital in shell plates, pipe and fittings while you wait eight or ten weeks for tank heads. You'll save money by using the less expensive stock sizes that are pressed, rather than odd sizes that must be spun. You also save time when you need stainless steel heads for new construction or for emergency replacement.

The Carlson stock is made up of ASME and Standard flanged and dished stainless steel heads. They range from 10″ O.D. through 72″ O.D., in 6″ increments, $\frac{3}{16}$″ through $\frac{3}{8}$″ Gauge, in Types 304, 304-L, 316, and 316-L. All are fully annealed and pickled after forming to provide maximum corrosion resistance. Flanges can be machined to your specifications in a matter of days.

In addition to maintaining the country's largest stock of stainless steel heads, dies are available for pressing heads in other grades of stainless. Special sizes can be spun when required. To get all the facts on this unusual Carlson service, mail the coupon and we'll send you the latest Heads File-Folder and Stock List.

G.O.CARLSON Inc.

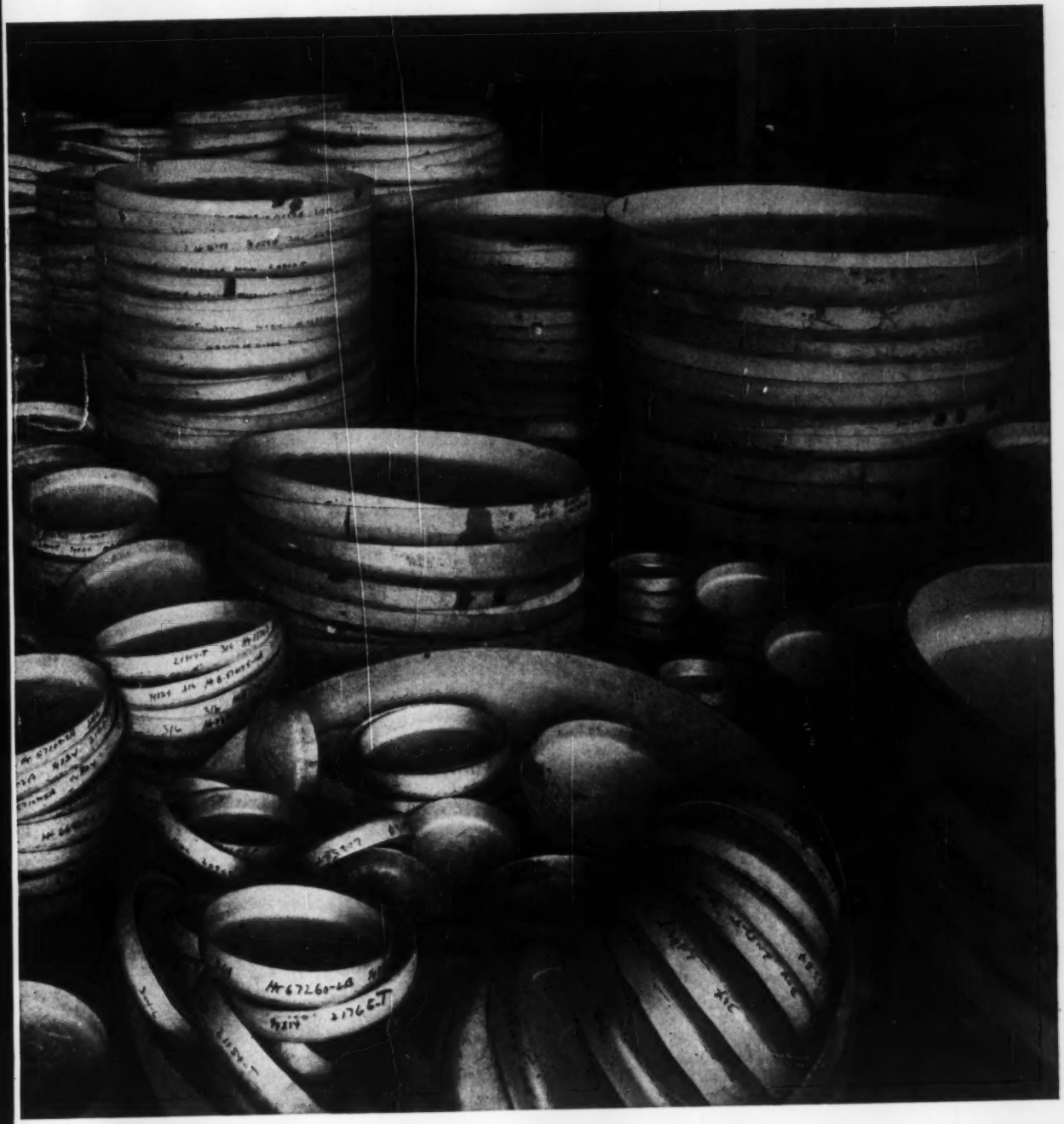
Stainless Steels Exclusively

THORNDALE · PENNSYLVANIA

District Sales Offices in Principal Cities

This Carlson Stainless Steel Heads File-Folder includes lists of Dies for press forming and information on flange machining.

PLATES • PLATE PRODUCTS • HEADS • RINGS • CIRCLES • FLANGES • FORGINGS • BARS and SHEETS (No. 1 Finish)



MAIL THIS COUPON

G. O. Carlson, Inc.
122 Marshalton Road
Thorndale, Pennsylvania

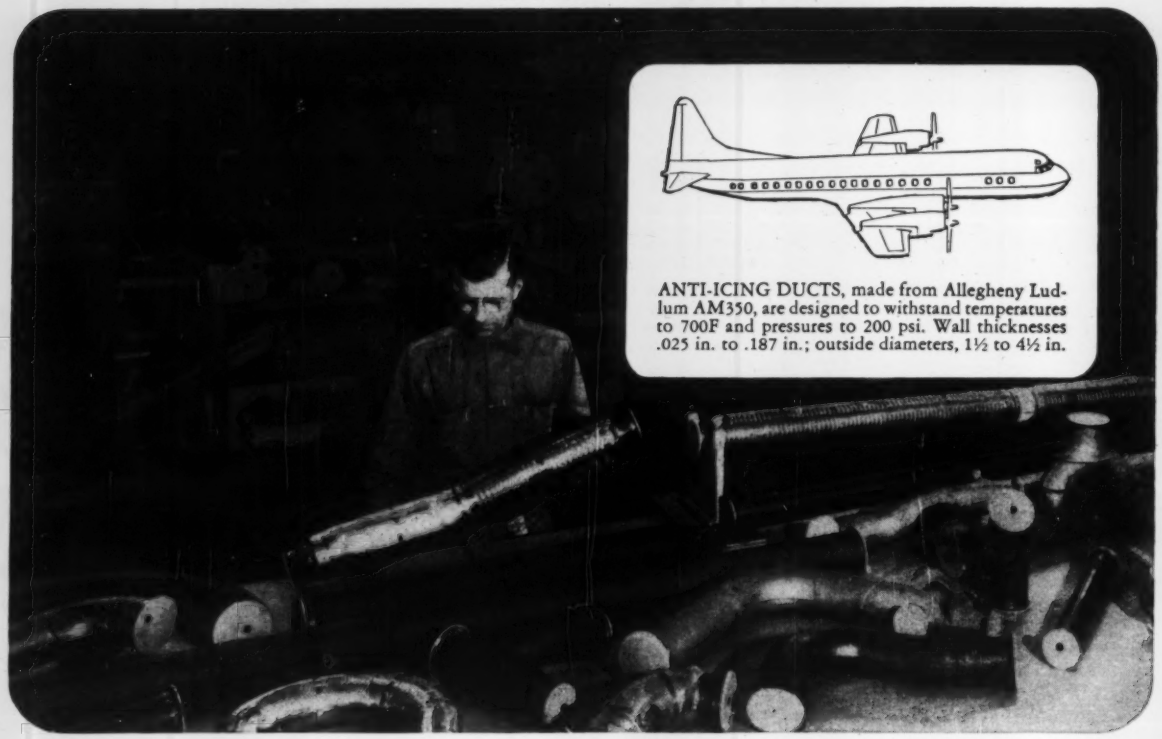
Please send me your Heads File-Folder and Stock Lists.

Name: _____

Company: _____

Address: _____

City: _____ State: _____



ANTI-ICING DUCTS, made from Allegheny Ludlum AM350, are designed to withstand temperatures to 700F and pressures to 200 psi. Wall thicknesses .025 in. to .187 in.; outside diameters, 1½ to 4½ in.

made from Allegheny Ludlum precipitation-hardening stainless:

Prop-jet's anti-icing ducts take high heat and pressure in stride

The anti-icing system of a new prop-jet airliner was designed to operate under high heat and pressure, yet the ducting had to be as light as possible. AM350 was specified. Both AM350 and AM355, Allegheny Ludlum's precipitation-hardening stainless steels, have strength/weight ratios at 600F five times greater than the usual aluminum aircraft alloy. In fact, AM350 and AM355 maintain high strength from room temperature up to 1000F.

These space age metals have other properties highly desirable: excellent corrosion resistance, ease of fabrication, low temperature heat treatment, good resistance to stress corrosion.

These features have been used to advantage in airframe structural members, airframe skins, pressure tanks, power plant components, high pressure ducting, nacelles and other missile and supersonic aircraft applications.

availability: AM350, introduced several years ago, is available commercially in sheet, strip, foil, small bars and wire. AM355, best suited for heavier sections, is available commercially in forgings, forging billets, plates, bars and wire.

corrosion resistance: Compared to the more familiar stainless grades, AM350 and AM355 resist corrosion and oxidation better than the hardenable grades (chromium martensitic) and only slightly less than the 18 and 8's. They resist stress corrosion at much higher strength levels than do martensitic stainless grades.

simple heat treatment: High strength is developed by two methods. Both minimize oxidation and distortion problems. The usual is the Allegheny Ludlum-developed sub-zero cooling and tempering (SCT): minus 100F for 3 hrs plus 3 hrs at 850F. Alternate method is Double Aged (DA): 2 hrs at 1375F plus 2 hrs at 850F.

easy fabrication: AM350 and AM355 can be spun, drawn, formed, machined and welded using normal stainless procedures. In the hardened conditions, some forming may be done . . . 180 degree bend over a 3T radius pin. Also AM350 can be dimpled in the SCT condition to insure accurate fit-up.

For further information, see your A-L sales engineer or write for the booklet "Engineering Properties, AM350 and AM355." *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.* Address Dept. S-13.

WSW 7341

ALLEGHENY LUDLUM

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

Project Alert Working at UDYLITE *Produces for You...*

SILICON EFFICIENCY, RUGGEDNESS AND LONG LIFE

for old rectifiers

1. **A SPECIAL PRODUCT** . . . For the first time, a Udylite-engineered, Udylite-built *silicon* replacement stack is offered for you to use in revitalizing your Udylite magnesium-copper-sulphide or selenium rectifier and upgrading its performance to the level of today's best. *And you can do this in your own shop*, without delay, at a minimum of expense and down time.
2. **A SPECIAL SERVICE** . . . As an alternate plan, your old rectifier can be returned to Udylite for *factory* installation of the silicon replacement stacks by trained rectifier specialists. At the same time, your rectifier will be completely overhauled and tested so that it will be returned to you renewed and ready for the longer life and high efficiency of Udylite silicon.
3. **A SPECIAL VALUE** . . . This whole program is set up as a Project Alert. A special department will handle your order and your equipment from start to a completely satisfactory finish. A *guaranteed delivery* will keep your down time to a minimum. With prices based on a production line plan, you will get more value per dollar spent than you ever before thought possible.

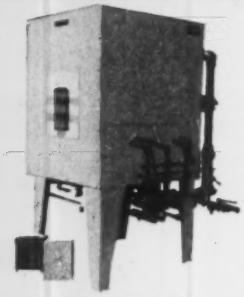
Let Udylite help you get your entire plating operation in top working order and ready to go at peak capacity. Your Udylite sales engineer will be calling on you soon. But if you need priority service, write, phone or wire directly to:

the udylite corporation

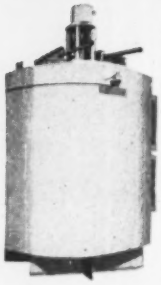
PROJECT ALERT

Wherever industry needs heat...

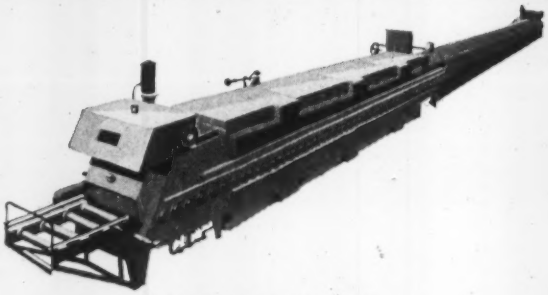
You'll find LINDBERG equipment just right for the specific job



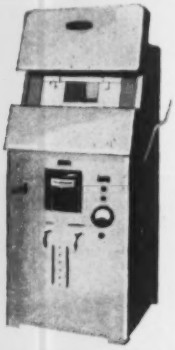
Ceramic Kilns: Gas-fired periodic kiln (shown) with temperature range to 3250° F.



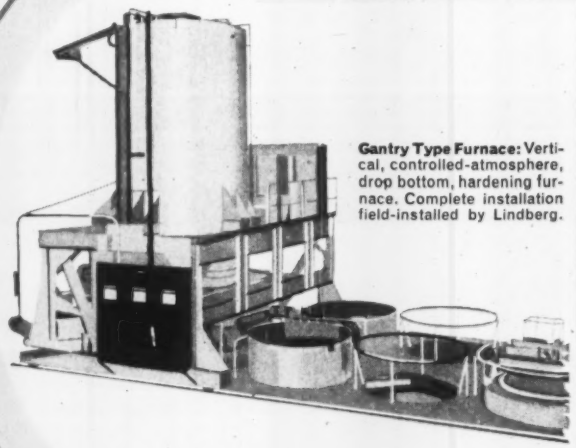
Vertical Type Furnaces: Carburizing and hardening furnace (shown) with CORRTHERM electrical heating elements.



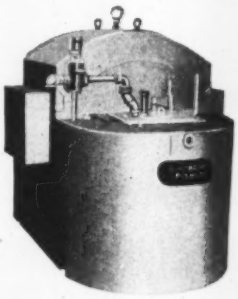
Roller Hearth Furnaces: Continuous electric type (shown) with temperature range 1300° to 2100° F.



Laboratory Equipment: One-unit box furnace (shown), muffle or for non-oxidizing atmosphere with temperature range to 3000° F.

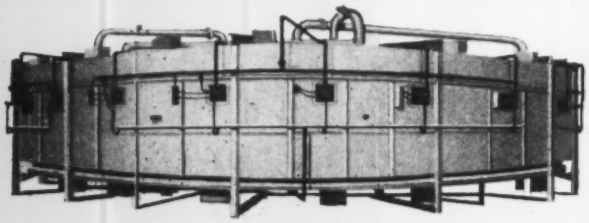


Gantry Type Furnace: Vertical, controlled-atmosphere, drop bottom, hardening furnace. Complete installation field-installed by Lindberg.

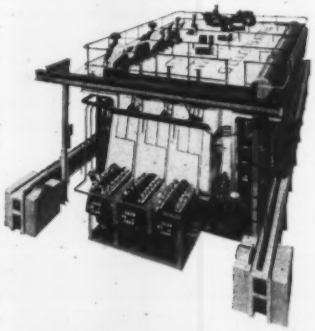


Melting and Holding Furnaces: Electric resistance furnace (shown) with capacities of 750 lbs. to 1500 lbs.

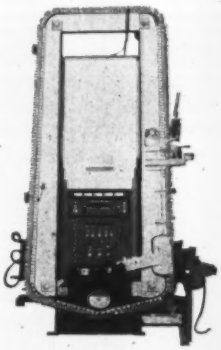
Aluminum Reverberatory Furnaces: Twin-chamber melting and holding furnace (shown) with 45,000 lbs. capacity.



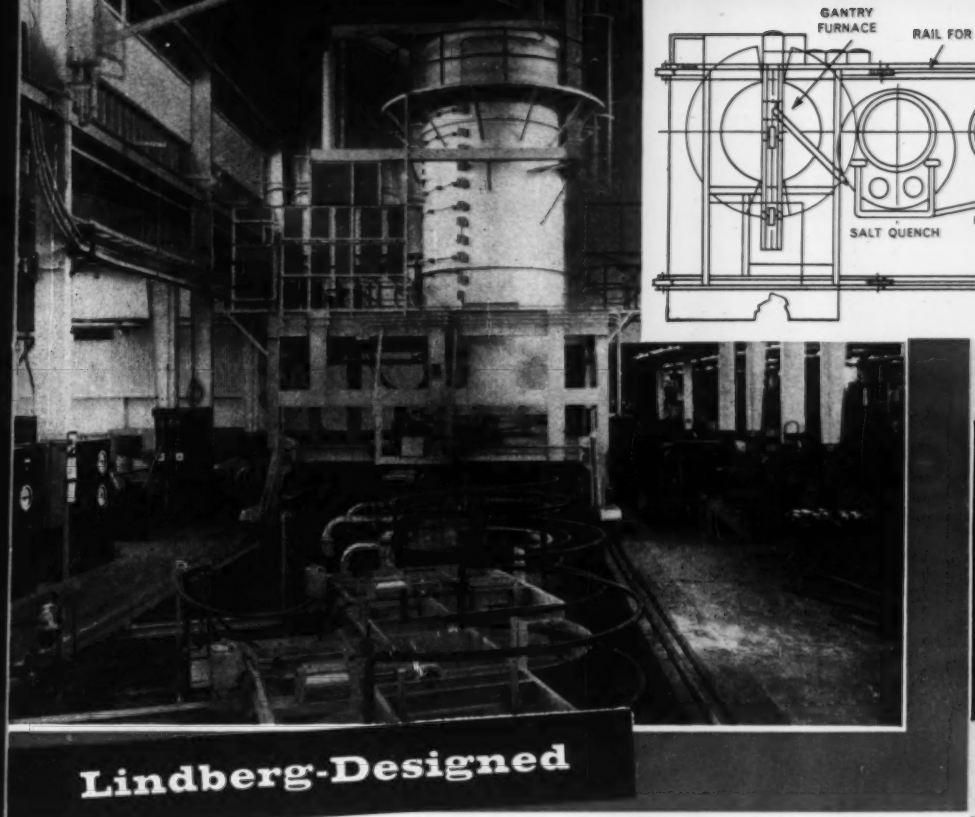
Rotary Hearth Furnaces: Doughnut type field-installed gas-fired furnace (shown) with capacity of 13,000 lbs. per hour.



Multiple Row Pusher Furnaces: Three-row, vertical radiant tube pusher carburizing furnace (Shown). Capacity, 650 lbs. per hour to case depth of 0.055".



High Frequency Units: Vertically designed, completely automatic "HF" unit (Shown) for aluminizing automotive valves.



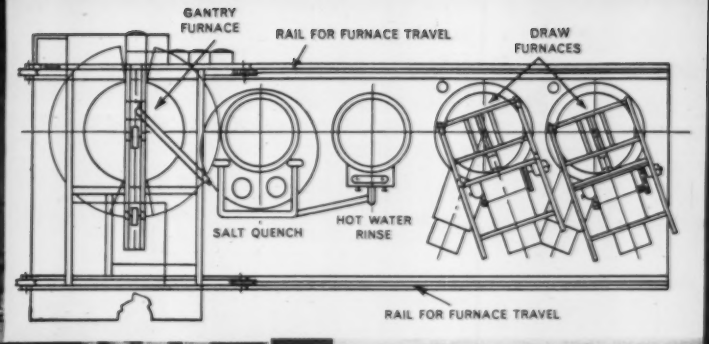
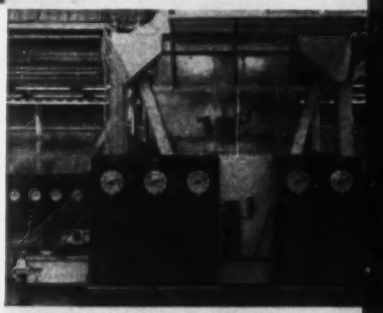


Diagram shows efficient grouping of all elements of the installation.

Lindberg-Designed

Furnace is more than 24 feet high. Chain shown at right lifts work into furnace.

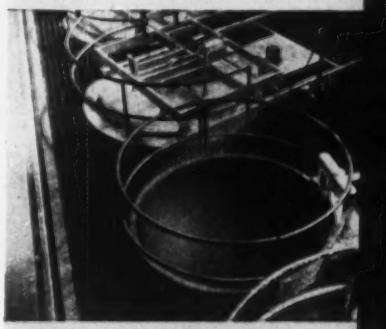
The World's Largest Vertical Controlled-Atmosphere Drop Bottom Hardening Furnace



Lindberg control panels are conveniently located adjacent to the installation.

This remarkable furnace combination was recently installed by Lindberg Industrial Corporation for a prominent missile manufacturer. It was designed by Lindberg engineers, in cooperation with the engineering staff of the manufacturer. The furnace is more than 24 feet high and is capable of heat treating rocket cases more than 5 feet in diameter and 20 feet long. The installation consists of the electric, controlled-atmosphere, Gantry type furnace and two draw furnaces, a hot water wash tank, a salt bath quench and a high nitrogen generator. The Gantry type furnace moves under power over the entire installation to load or unload at any of the pit stations. With this installation, production has been economized and speeded, and the metallurgical qualities of rocket cases improved.

Lindberg equipment and Lindberg planning can help you find the most effective answer to any problem of applying heat to industry. We cover the field, heat treating, melting and holding, tempering, brazing, enameling furnaces, ceramic kilns, high frequency units, and are in the ideal position to recommend just the type of equipment most suitable for your needs. This can be factory built or field-installed in your own plant, fuel-fired or electric. Consult your local Lindberg Field Representative (see the classified phone book) or get in touch with us direct. Lindberg Industrial Corporation, 2321 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.



Pit has depth of more than 20 feet to accommodate large rocket cases.

heat for industry

CLEVELAND is the name and the place for

Top quality Realsteel shot and grit...from our NEW Toledo Plant

THIS latest addition to our Toledo production facilities has been built, improved, and staffed to produce only the best in quality metallic abrasives.

Toledo Realsteel shot and grit is produced here in an electric furnace, oven-dried, heat treated, screened and packaged, using the latest quality control methods.

This plant is strong evidence that we are interested in turning out a top quality product, to rigid specifications, in order that you may have the finest in metallic abrasives to fit your particular requirements.

Palletized, banded, covered . . . any way you wish.

Try Toledo Realsteel . . . another in the Cleveland line of Persuasive Abrasives.

CLEVELAND ABRASIVES

1. Realsteel Shot and Grit 2. Pearlitic Malleable 3. Normalized
4. Hi-Strength "A" 5. Chilled Iron 6. Drawn Steel

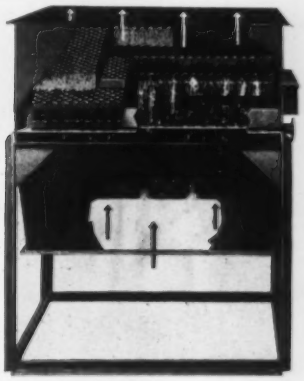
CMA

the CLEVELAND metal abrasive company

.....world's largest producer of metallic abrasives.....

GENERAL OFFICE: 888 EAST 67th STREET • CLEVELAND 3, OHIO • PLANTS AT HOWELL, MICHIGAN; TOLEDO; CLEVELAND

This new unit stops destructive plant mists and vapors



This is the Type M Cycoil, newest product of AAF dust control research. It is a special dust collector designed to do a specific job: collect the mists and vapors that ruin automobile finishes, plant roofs and neighborhood home exteriors. It does its job well. It is higher in efficiency, lower in cost, lighter in weight and less space-consuming than conventional collectors used for this service. Bulletin 286 describes the Type M Cycoil in more detail.

AAF

American Air Filter

BETTER AIR IS OUR BUSINESS

Mr. Robert Moore
American Air Filter Company, Inc.
443 Central Avenue, Louisville, Ky.

Please send me Type M Cycoil Bulletin 286.

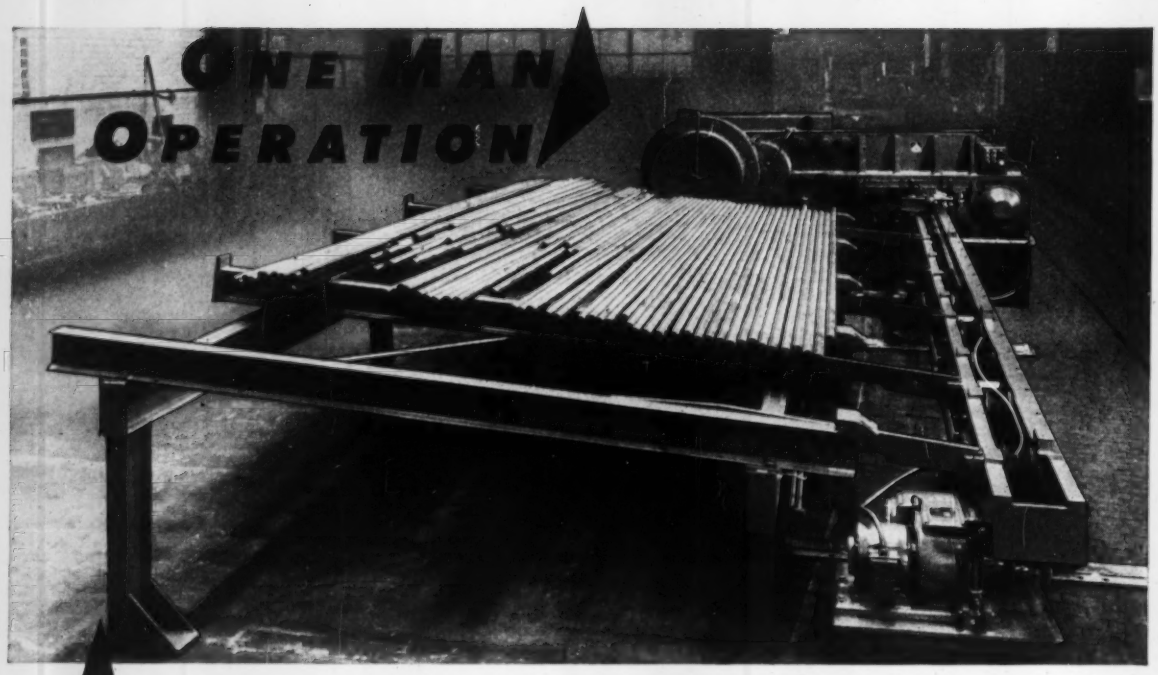
Name_____

Company_____

Address_____

City_____ State_____

In Canada: American Air Filter of Canada, Ltd.,
400 Stinson Blvd., Montreal 9.

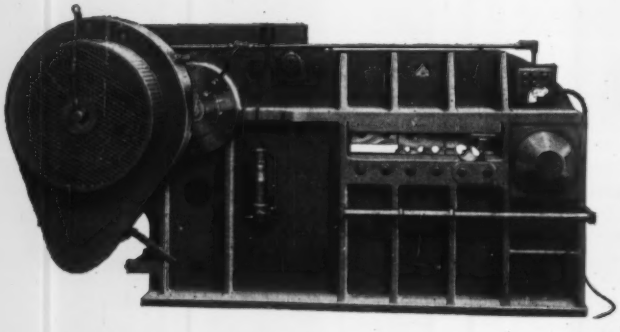


Production cutting of bar stock on a ***HILL ACME*** *Bar-Billet Shear with auxiliary automatic feed*

The nearest thing to automation achieved so far in the production cutting of bar stock is the HILL ACME BAR-BILLET shear with auxiliary automatic feed. With one man as standby observer, bars are fed automatically from the rack to the roll feed mechanism. Automatic stops on the billet shear predetermine the length of cut.

On ideal installations bars travel from steel storage on conveyors through the billet shear to tote boxes without being touched by hand.

HILL ACME BAR-BILLET shears have proven to be the most efficient, economical and trouble-free units on the market today. With the exclusive outboard support on the drop-off side, square, accurate cuts are assured. These high production shears are built in a variety of sizes to meet every cutting need up to 9″ in rounds. A new bulletin covering all details of construction and operation is now available.



The

HILL ACME

Company

MANUFACTURERS OF:
"CANTON" ROTARY SCRAP SHEARS • ALLIGATOR SHEARS • BILLET SHEARS • "HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "ACME" FORGING • THREADING • TAPPING MACHINES • "CLEVELAND" KNIVES & SHEAR BLADES

1201 West 65th St., Cleveland 2, Ohio

"WEIRKOTE'S® SOMETHING SPECIAL! IT CAN END THE NEED FOR ANY FURTHER CORROSION PROTECTION AFTER FABRICATION."

Q. You mean it? Weirkote can save you the cost of any further processing for corrosion protection after fabrication?

A. Absolutely. It's the continuous process that does it. Integrates the zinc to the steel so tightly there's never any peeling or flaking. No matter how severe the fabrication—any torture test you put it through—that bond stays put!

Q. Hmmm. Weirkote sounds great. One thing—is its zinc coating uniform throughout?

A. To the nth degree! Even the hardest-to-reach areas on the most complicated fabrications are completely protected.

Q. Corrosion-protected, you mean?

A. Corrosion-protected all over! So much so that you can work Weirkote to the very limits of the steel itself. So there you have it: stepped-up manufacturing efficiency, sharply curtailed manufacturing costs. All from Weirkote!

Send for free booklet that details the time-and-cost-saving advantages of skin-tight zinc-coated Weirkote. Just write Weirton Steel Company, Dept. B-1, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

GREATER ACCURACY...

Your most effective Profit-Builder

The products that sell most successfully in today's competitive markets – and build the biggest profits for their manufacturers – are those most capable of meeting today's higher standards for quality and performance. And because greater accuracy is the sure, economical way to increase product quality and performance, precision properly applied can be your most effective profit-building tool.

Therefore, the continued use of machine tools designed for yesterday's standards of accuracy is poor economy today. That's why manufacturers are finding that the superior accuracy made possible by Pratt & Whitney Machine Tools means more accurate components, fewer rejects . . . and products that perform better, win wider acceptance and build bigger profits.

NUMERICAL CONTROL . . . Puts Toolroom Precision into Production

Pratt & Whitney conducts an intensive program of research and development that is making it possible to combine toolroom standards of accuracy with production-line speed, efficiency and economy.

One of the most outstanding recent developments produced by this program is Numerically-Controlled equipment. Applied to P&W Jig Borers, Rotary Tables and other Machine Tools, numerical control eliminates human error and makes it possible to produce jobs calling for "tenths" precision *as fast* as work calling for "thousandths" limits. Output is greatly increased, and the extreme accuracy of these machines can be applied efficiently to production work. Most important – with more time spent in actual machining and less time spent in reading and interpreting blueprints, manually positioning the machine, checking settings and other non-productive operations – *machine utilization efficiency is more than doubled!*

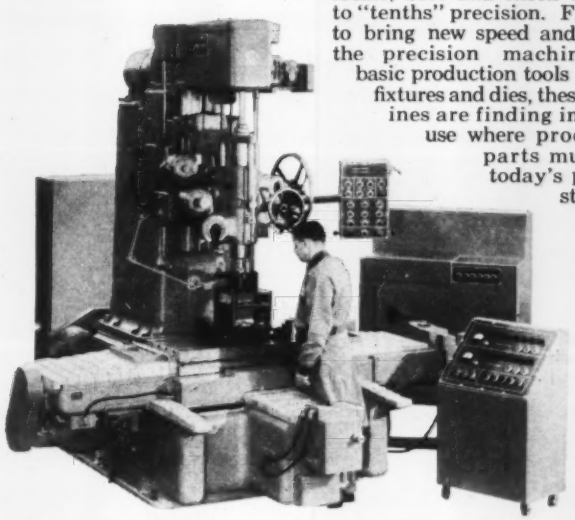
PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

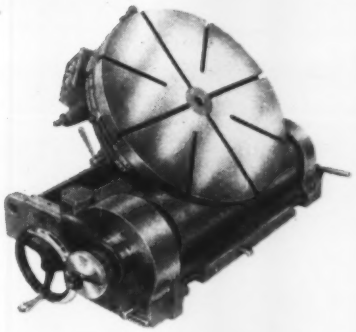
P&W JIG BORERS . . .

locate, bore and check accurate to "tenths" precision. First used to bring new speed and ease to the precision machining of basic production tools like jigs, fixtures and dies, these machines are finding increasing use where production parts must meet today's precision standards.



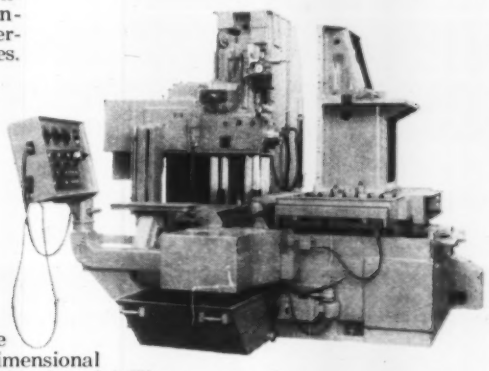
P&W PRECISION ROTARY TABLES . . .

make it possible to combine lower production costs with increased accuracy where machining requires circular spacing or angular positioning. Also used for inspecting or graduating, these P&W Tables combine rugged construction with accuracy to *seconds of arc!* Produced in a complete line, that includes horizontal, vertical and tilting types.



P&W KELLER MACHINES . . .

are automatic, tracer-controlled millers that accurately reproduce the shape of any 2-dimensional template or 3-dimensional model. The ideal machine for fast, economical production of dies, molds and prototypes, P&W Kellers are now finding extensive use for production work.



Other Pratt & Whitney Machine Tools

VERTICAL PRECISION HOLE GRINDER

"Tenths" accuracy plus grinding speeds to 100,000 rpm.

"VELVETRACE" MILLING MACHINE

Ultimate in accuracy for 3-dimensional tracer-controlled reproduction.

MAGNESPARK VERTICAL PROFILERS

A new concept in tracer control for automatic 360° profiling.

AUTOMATIC DUPLICATING MACHINES

Duplicate dies and molds quickly, accurately and economically.

CUTTER and RADIUS GRINDERS

Grind practically every type of standard and special cutter . . . quickly, accurately.

VERTICAL SHAPERS

Handiest machines in any shop for fast, accurate handling of irregular shaped work.

MODEL C THREAD MILLERS

Unusually versatile; set new standards for accuracy, finish and economy.

DEEP HOLE DRILLERS

Twin drilling units produce true holes up to 129" deep in a single, uninterrupted operation.

Free Literature . . . on all P&W Machine Tools is available. No obligation. Write on your company letterhead, and ask for Circular 605-1.

PRATT & WHITNEY COMPANY, INCORPORATED

13 Charter Oak Boulevard, West Hartford, Connecticut

Branch Offices in the following cities:

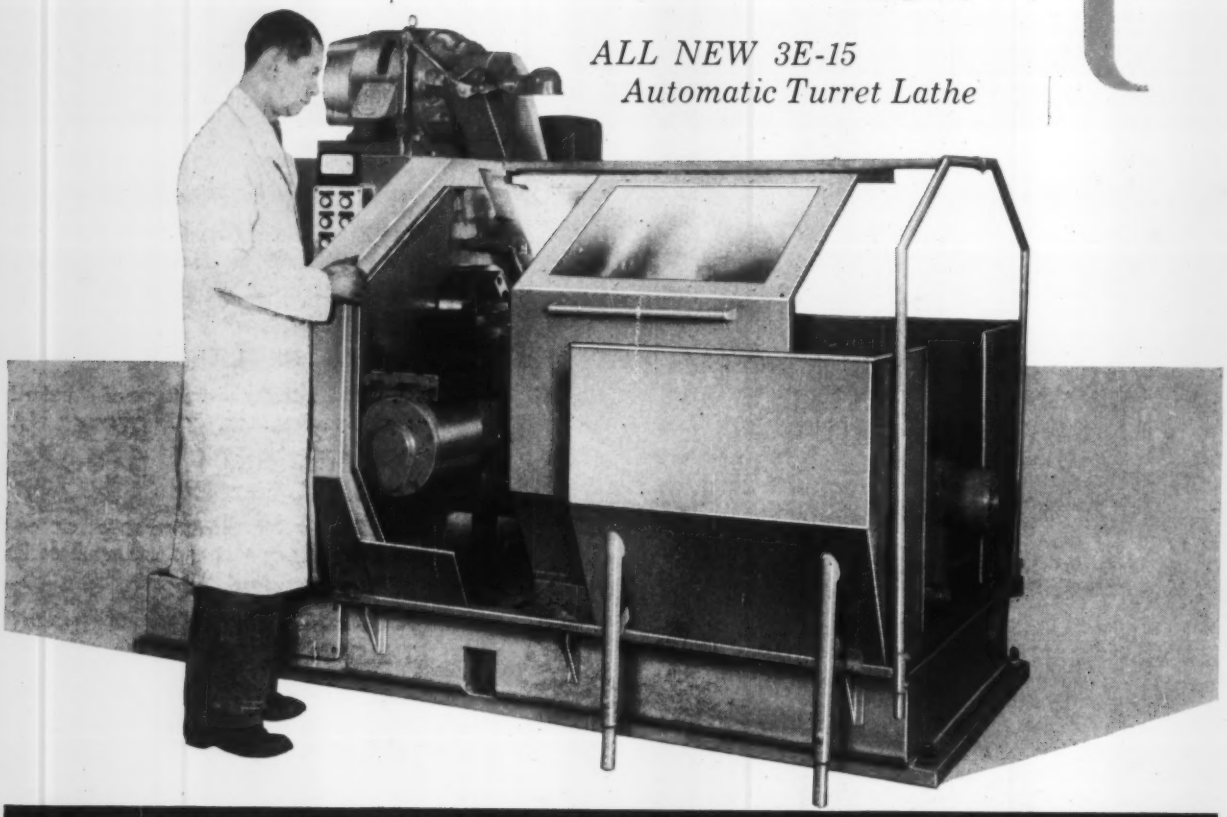
BIRMINGHAM, ALA., BOSTON, MASS., CHARLOTTE, N. C., CHICAGO, ILL., CINCINNATI, OHIO, CLEVELAND, OHIO, DENVER, COLO., DETROIT, MICH., JUPITER, FLA., LIVINGSTON, N. J., LOS ANGELES, CALIF., MILWAUKEE, WISC., NEW YORK, N. Y., PHILADELPHIA, PENNA., PITTSBURGH, PENNA., ROCHESTER, N. Y., ST. LOUIS, MO., SAN FRANCISCO, CALIF., SYRACUSE, N.Y., WEST HARTFORD, CONN.

Representatives in the following cities:

DALLAS, TEX., HOUSTON, TEX.

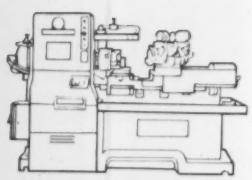
"CUT Machining Time 45% and INCREASED PRODUCTION 45%"

ALL NEW 3E-15
Automatic Turret Lathe

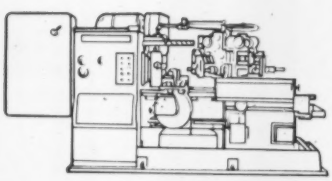


FROM THE COMPACT, HIGH-SPEED 3-U, with 6" chuck

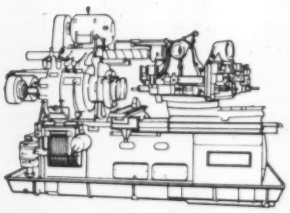
3-U SPEED-FLEX



4-U AUTOMATIC



5-D POWER-FLEX



POTTER & JOHNSTON AUTOMATICS ARE AVAILABLE IN A COMPLETE

This Statement comes from a manufacturer who recently replaced his old, inefficient hand operated machines with new Potter & Johnston Automatic Turret Lathes. Reports from some of the many other manufacturers who have replaced with P&J include statements like these: "We reduced machine-hours 71%" . . . "Our company eliminated 4 machines and reduced operating costs" . . . "P&J Machines helped us save 66% in labor costs" . . . "We cut machining time in half and eliminated inaccuracies!" And remember – this is the kind of cost-cutting, time-saving performance *you* can expect in your plant when you replace with Potter & Johnston Automatics!

P&J Automatics deliver profit-building performance like this, because they incorporate every design advance and construction detail that can help you produce faster at lower cost. For example, the new 3E-15 shown here offers you: Extra power and rigidity for faster, more accurate metal removal . . . selector-switch cross slide control, independent turret indexing drive, extra-large control drum and 6-face turret for faster, easier set-up and maximum tooling flexibility.

Tape Control. Where the ultimate in productivity and flexibility is desired – P&J Automatics can now be equipped with Tape Control for all machine motions. This important advance in industrial production methods greatly reduces setup time and insures optimum programming and cycling with minimum floor-to-floor time. All your jobs can be handled with greater efficiency . . . the cost-cutting advantages of fully automatic operation are made available for very short as well as long production runs.

Send Now for the Facts . . .

that will prove how P&J Automatics can help you speed production, improve work quality and reduce costs. Write for your free copies of P&J Case-History Reports . . . or ask to have a Representative visit your plant and analyze your requirements. There's no obligation, of course. Potter & Johnston Company, Pawtucket, Rhode Island.

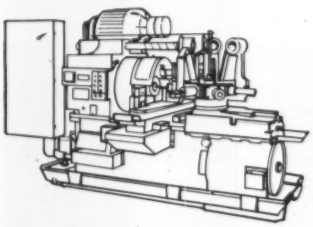
POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

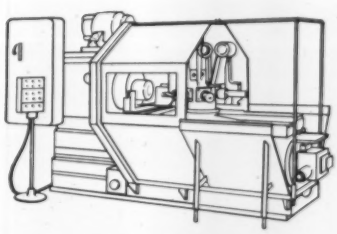
PRECISION PRODUCTION TOOLING SINCE 1898

. . . TO THE GIANT 10-U, with chuck sizes to 42"

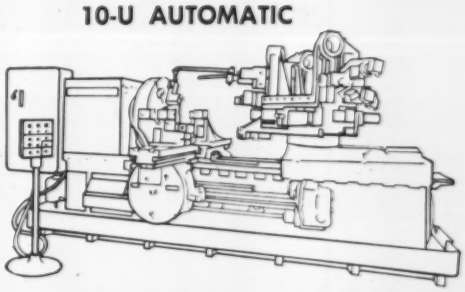
6-D AUTOMATIC



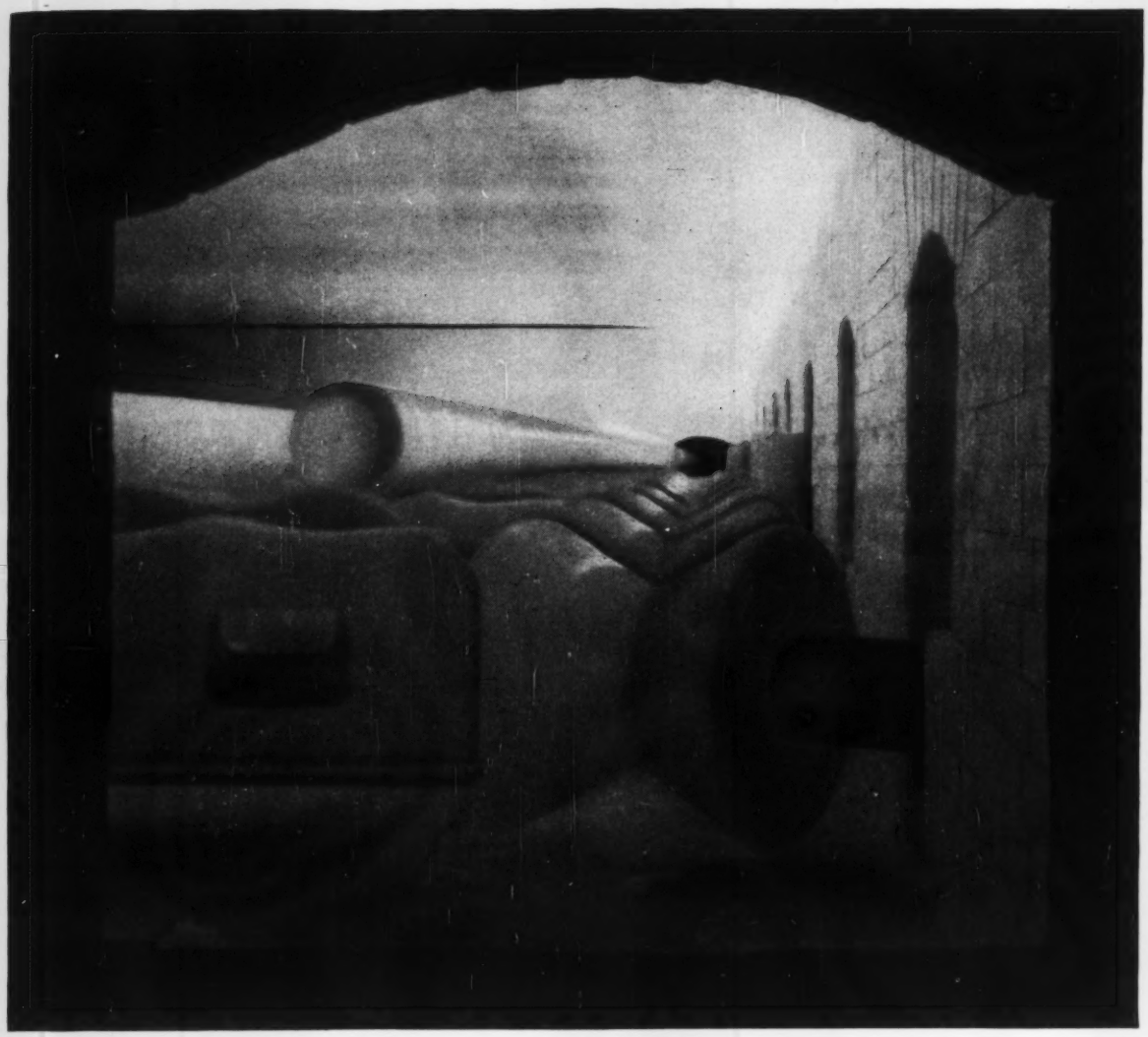
8-U AUTOMATIC



10-U AUTOMATIC



LINE TO HANDLE EVERY JOB FASTER AND BETTER AT LOWER COST!

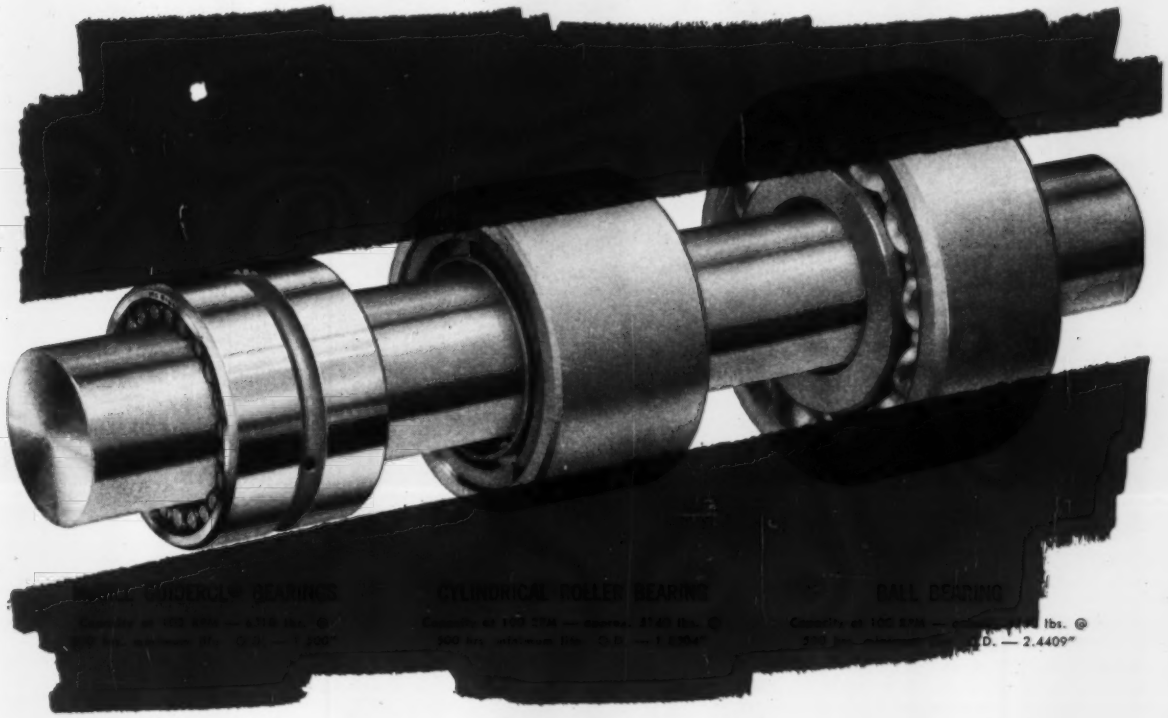


Interior of a high temperature, hearth type Gas furnace specially designed for heat treating high strength steel casing

J&L speeds production, decreases costs . . . thanks to *GAS*

This Gas furnace at Jones & Laughlin Steel Corporation, Aliquippa Works, Pennsylvania, assures high strength characteristics formerly attained by adjusting the chemical composition of the steel. With Gas, J&L speeds production of special high strength seamless tubular products. Heat treating these products with Gas also saves tons of strategic materials like manganese, molybdenum and chromium, formerly used in the production of high strength seamless pipe.

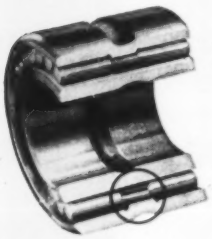
For information on how Gas can help you with your production problems, call your Gas Company's industrial specialist. He'll be glad to discuss with you the economies and outstanding results you get with Gas and modern Gas industrial equipment. *American Gas Association.*



GUIDEROL® BEARINGS SAVE RADIAL SPACE
. . . . . and still offer greater load capacity

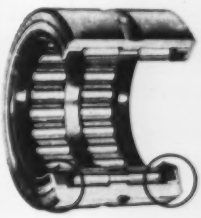
This graphic illustration demonstrates the radial space saving advantages of McGill GUIDEROL bearings that offer still greater capacity than the other two types of bearing compared. For a common 1" shaft, the GUIDEROL bearing GR-16 has an O.D. of only 1½" with a capacity of 6310 lbs. Compared to a cylindrical type roller bearing the GUIDEROL bearing requires ⅜" less housing space and offers 23% more capacity. A ball bearing for the same shaft uses almost an inch larger O.D. to carry 1500 lbs. less radial load.

CENTER GUIDED ROLLERS



GUIDEROL bearings pack more performance into smaller radial space. Their construction offers the inherent high capacity of a full complement needle bearing combined with effective roller control. Center guided rollers limit roller skewing tendencies and prevent binding under adverse conditions in either horizontal or vertical mountings. This qualifies GUIDEROL bearings for applications which are too heavily loaded for retainer type needle bearings, but are subject to misalignment that precludes the use of unguided needle bearings. Standard GR series GUIDEROL bearings are available, with or without inners, in shaft sizes from ⅝" to 9¼" with capacities ranging from 2880 lbs. to 128,670 lbs. (at 100 RPM).

LUBRICATION LOCKED IN, CONTAMINATION OUT; IN SEALED GUIDEROL BEARINGS



Pre-lubricated and sealed SG series GUIDEROL bearings are interchangeable dimensionally with standard GR series GUIDEROL bearings. They offer 5 possible seal combinations. Specify the sealed bearings for applications that are exposed to dust, dirt, grit or where accessibility for lubrication is a problem. Your McGill representative will be happy to assist you with special application problems. Ask him for recommendations or write the McGill Engineering Department.

For Complete Data on Dimensions, Capacities and Application of McGill Precision Needle Bearings, Send for Free Catalog No. 52A.

engineered electrical products

McGILL®

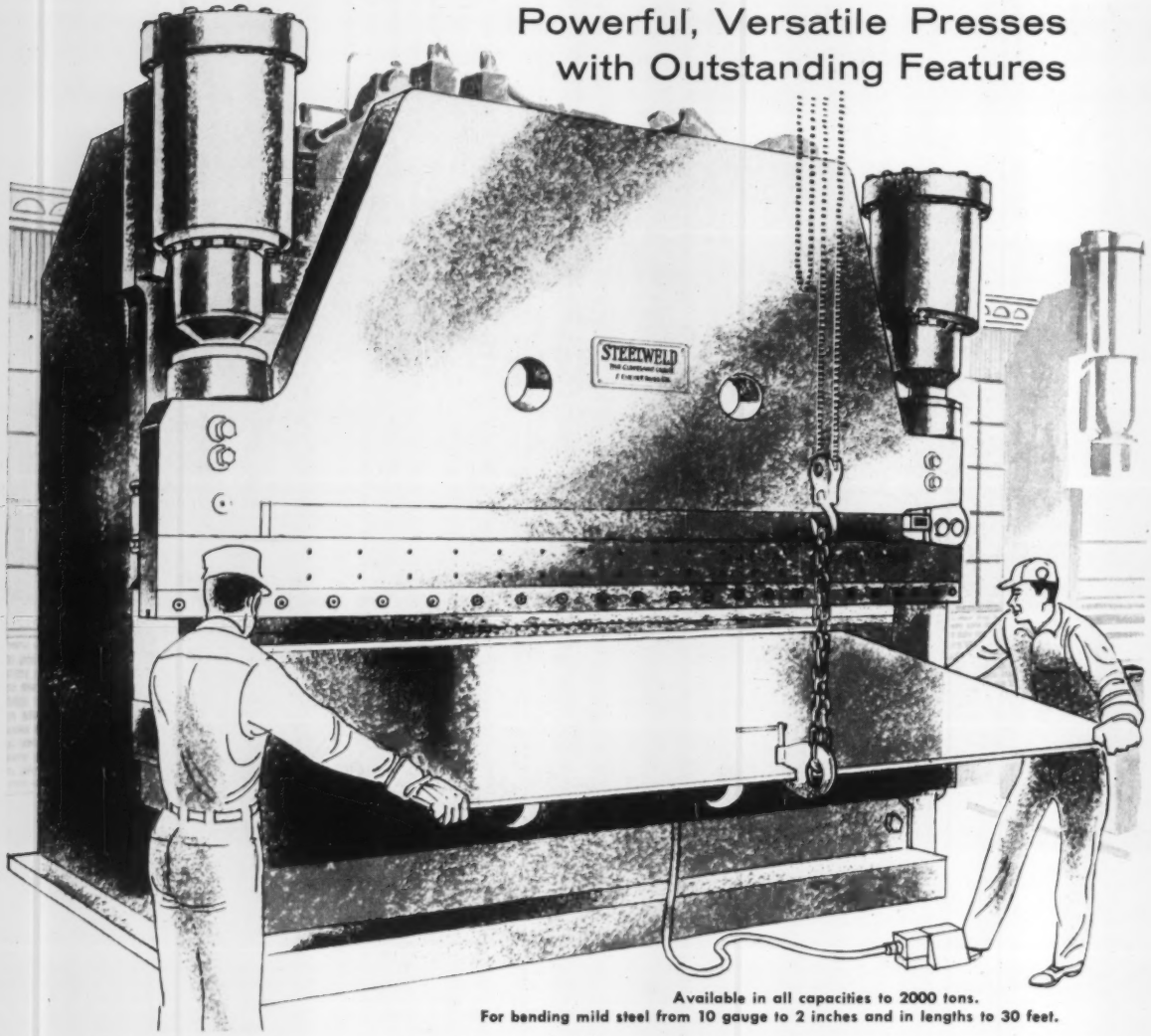
precision needle roller bearings

McGILL MANUFACTURING COMPANY, INC., BEARING DIV., 301 NORTH LAFAYETTE ST., VALPARAISO, INDIANA

STEELWELD

HYDRAULIC PRESS BRAKES

Powerful, Versatile Presses with Outstanding Features



Available in all capacities to 2000 tons.
For bending mild steel from 10 gauge to 2 inches and in lengths to 30 feet.

- **Positive overload protection.**
- **Constant power during entire stroke.**
- **Ram reversible at any point.**
- **Stroke quickly adjusted for any length.**
- **Fast ram approach and return—slow-speed pressing.**
- **Operating pressure simply adjusted.**
- **Accurate ram level automatically maintained.**
- **Ram easily tapered.**
- **Simple, safe to operate.**

HEAVILY built and of finest quality throughout, Steelweld Hydraulic Press Brakes are of the most advanced design with all features desirable for ease of operation, maximum production and finest performance.

They are versatile machines capable of handling a wide variety of operations. They are ideal for jobbing shops, as well as for mass-production work. They work to close tolerances and have ample speed.

We urge you to get the facts on these outstanding brakes that have so much to offer you.

Write for free copy of catalog No. 2024A.

STEELWELD

HYDRAULIC PRESS BRAKES

Other Steelweld Machinery:
Hydraulic Shears; Mechanical Shears and Press Brakes; One-, Two- and Four-point Straight-Side Presses; Hi-Draw Presses.

THE CLEVELAND CRANE & ENGINEERING COMPANY · 7871 EAST 281st STREET · WICKLIFFE, OHIO

MISSILE MANUFACTURER

63% savings in time . . .

SPECIAL EQUIPMENT

Outp

SUBC

Excel

ICEMAK

$25.92

FOUNDRY EQUIPMENT MAKER

Above $4000 yearly savings...

excellent accuracy, duplicating to less than .001". . . clean front and ease of conversion to regular or Copymatic operation are outstanding . . . removing 15 to 30% more metal than our best (lathes) — twice that of some.

MACHINE TOOL BUILDER

82% time saved . . .

MACHINING SUBCONTRACTOR

Saving

EQUI

Out

TOO

82%

AIRCRAFT SUBCONTRACTOR

Helps make deliveries and money..

NOTED BOAT BUILDER

$2000 annual saving . . .

ELECTRONICS MANUFACTURER

Production increased 200%

Shown is 90° COPYMATIC Lathe with 4-Way Power Rapid Traverse, (optional extra). 45° COPYMATIC and Powershift Preselector headstock also available.

HOW TO JUSTIFY YOUR LATHE REPLACEMENT

LOOK AT LODGE & SHIPLEY FIRST!

More production at lower cost is the answer to constant upward pressure on prices. Savings proved in Lodge & Shipley case histories* show the wisdom of investigating *and* buying a Lodge & Shipley POWERTURN Lathe as a profitable replacement.

Production requirements change. The lathe purchased just a short time ago may not be adequate . . . judged by today's production, accuracy and economic standards. Details in Sweet's Machine Tool File; contact local representative through Yellow Pages or write direct for case histories and Bulletin No. L-103:

The Lodge & Shipley Co., 3070 Colerain Avenue, Cincinnati 25, Ohio.

**Names and details on request.*

Lodge & Shipley

big or small, Surface mechanized furnaces pay off

Whether your volume is modest or vast—with short runs or long—there are many ways to profit from Surface experience in mechanizing heat treat equipment for ferrous and nonferrous metals. All of them give you uniform duplication of results; upgraded labor; reduced unit costs; expanded capacity; and strengthened competitive position.

You may require a single batch type furnace, (right above) in which work is handled automatically from charge to discharge. For expanded facilities, a battery of such furnaces can be handled by one operator. Standard furnaces can also be linked in sequence to form an automatic heat treat line.

You might want your furnaces integrated directly with machines at separate points in your production line, (right center). This line processes bearing races from raw stock through a sequence of manufacturing operations—machining, heat treating, and finishing.

Your methods may call for a self-contained automatic heat treat line within your production line, (right below). Hoppers convert variable production from machining operations to the steady rate best for efficient heat treating. All operations are interlocked and continuous.

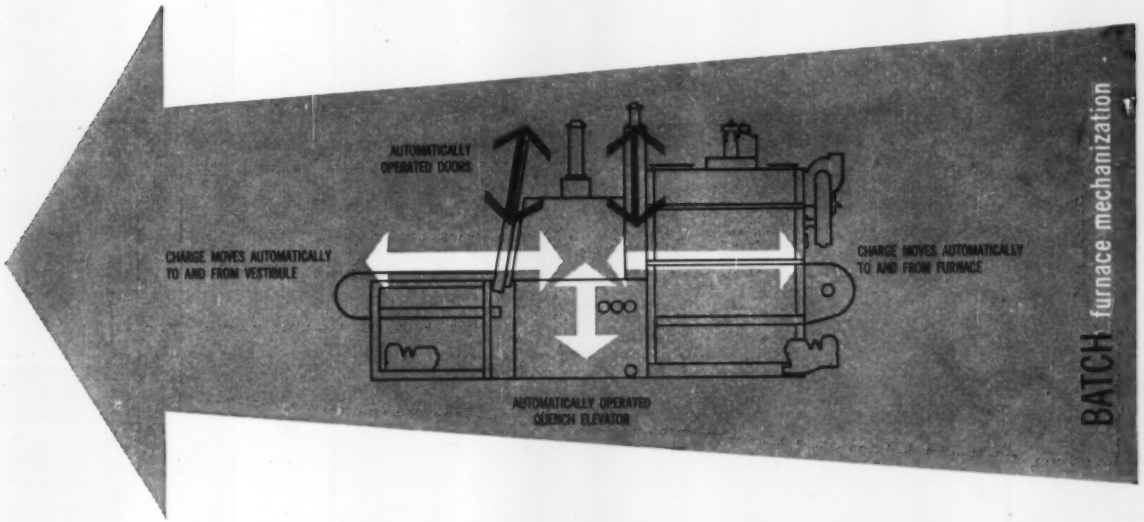
These are merely samples of the range and depth of mechanization know-how which Surface has accumulated since as far back as 1929. That was the date of installation of a completely automatic line for normalizing, hardening, and tempering transmission parts. Still operating, that line has paid for itself many times over.

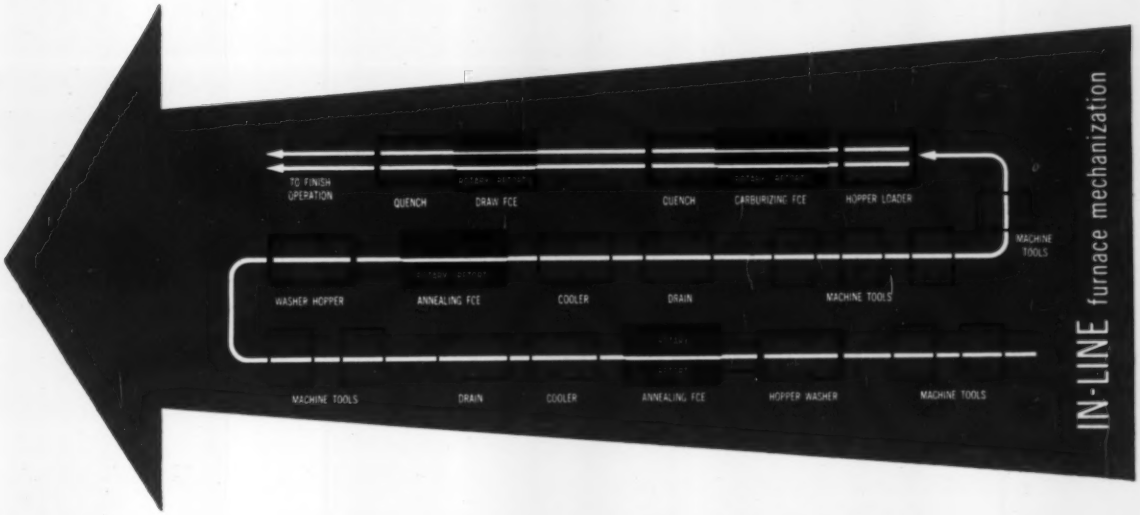
Explore these advantages for your own operation; write for Bulletin SC-176.

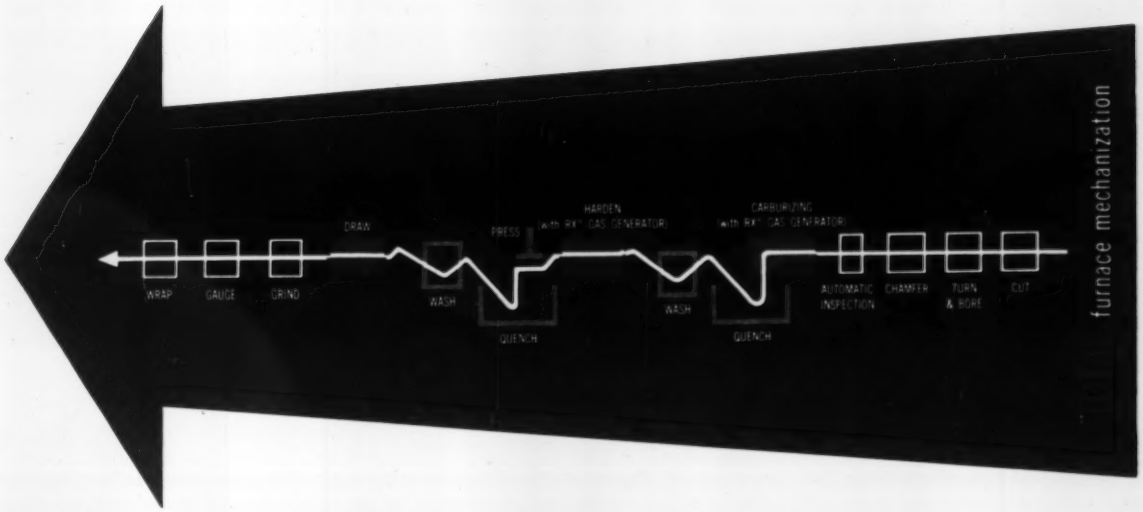
Surface Combustion Corporation, 2385 Dorr St., Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

Surface

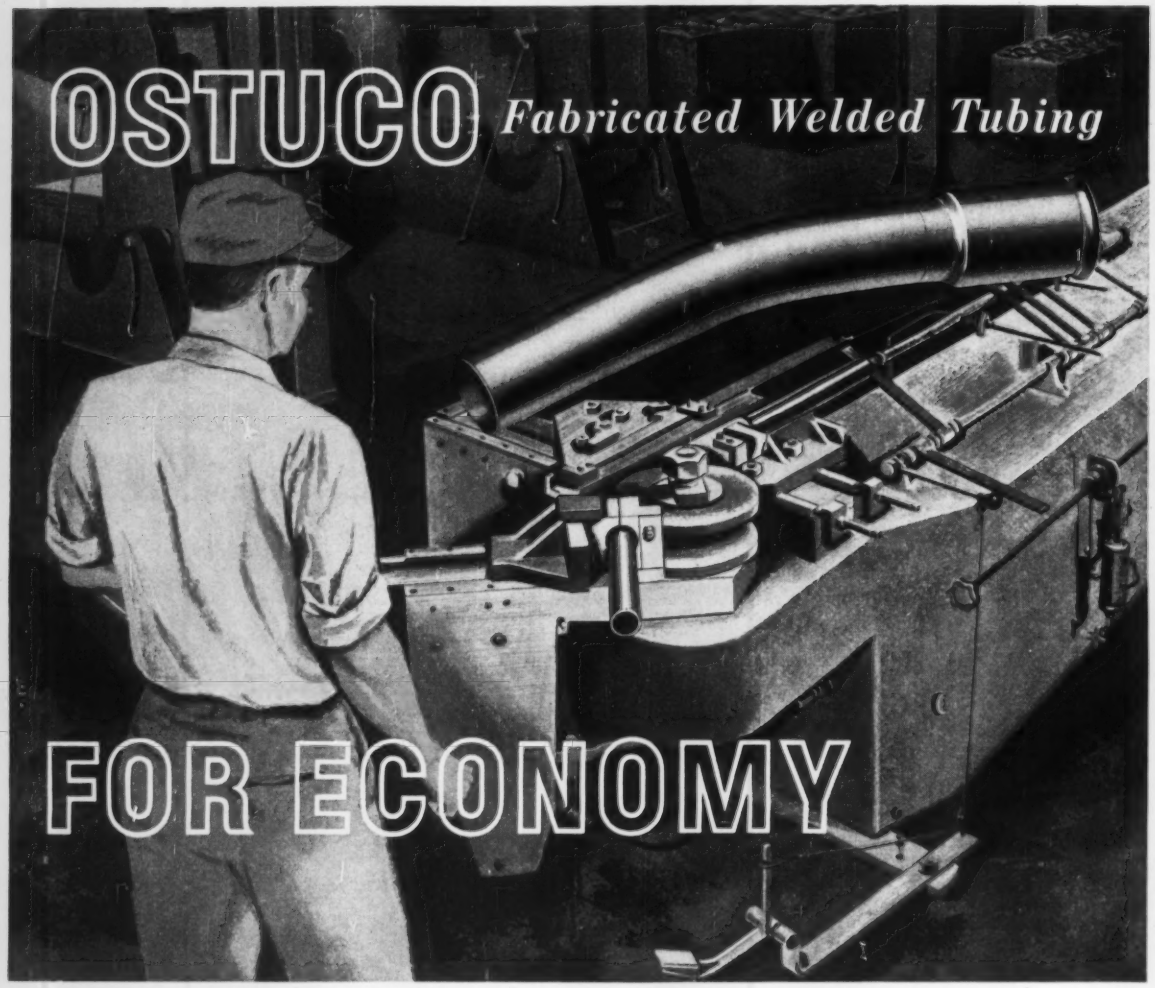
wherever heat is used in industry


AUTOMATICALLY OPERATED DOORS
CHARGE MOVES AUTOMATICALLY TO AND FROM VESTIBULE
CHARGE MOVES AUTOMATICALLY TO AND FROM FURNACE
AUTOMATICALLY OPERATED QUENCH ELEVATOR
BATCH furnace mechanization


TO FINISH OPERATION
QUENCH
DRAW FCE
QUENCH
CARBURIZING FCE
HOPPER LOADER
MACHINE TOOLS
WASHER HOPPER
ANNEALING FCE
COOLER
DRAIN
MACHINE TOOLS
MACHINE TOOLS
DRAIN
COOLER
ANNEALING FCE
HOPPER WASHER
MACHINE TOOLS
IN-LINE furnace mechanization


DRAW
PRESS
HARDEN
CARBURIZING
WRAP
GAUGE
GRIND
WASH
QUENCH
WASH
QUENCH
AUTOMATIC INSPECTION
CHAMFER
TURN & BORE
CUT
furnace mechanization

Vacuum Cleaner Manufacturer Specifies



Bending vacuum cleaner wand. A variety of fabricating operations also is performed on Ohio Special Quality Seamless Tubing.

"Value analysis showed it would be more economical to buy than produce fabricated welded tubing parts for our new cleaner. What's more, we could avoid additional capital investment in equipment.

"So we added Ohio Seamless to our production line. They have the equipment and facilities to meet our design requirements and to hold to our stepped-up schedules. And we don't pay shipping costs on scrap — just on finished parts . . ."

Let Ohio Seamless translate your designs into finished parts . . . conserve your capital . . . cut your production and shipping costs. Contact your Ohio Seamless representative, listed in the Yellow Pages, or the mill at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.*

AA-8847

OSTUCO SHELBY, OHIO — OSTUCO TUBING

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company · SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, St. Petersburgh, Salt Lake City, Seattle, Tulsa, Wichita CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

ANOTHER OF THE GARLOCK 2,000

LET 'EM ROLL...

fully protected by Garlock KLOZURE* Oil Seals

Each mammoth roll of a rolling mill is precisely designed and balanced. KLOZURE oil seals help maintain that balance through maximum bearing protection.

GARLOCK KLOZURE 142A—designed primarily for steel mills to seal surfaces perpendicular to shaft such as at end of mill roll. Acts as initial seal, keeps excessive water. scale, and other foreign matter from bearing oil seals. Available in any length for any diameter over 12". Comes in straight strip with strap for fastening. Maximum surface speed 5000 fpm, temp. 250° F. constant.

GARLOCK KLOZURE 2782—Positive oil seal protection for steel mill bearings. Garter spring holds Buna-N sealing element in contact with shaft. Precision formed case molded to sealing element protects seal from damage, and provides a press fit for proper installation. Available normal to high speed use on shafts to 48" dia., temperatures to 250° F, and for applications involving low pressure differentials.

It's easier to find the KLOZURE Oil Seal for your job because Garlock has one of the largest stocks available. Moreover, for any sealing problem, you can choose from the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals. The only complete line. Call your Garlock representative or write for KLOZURE Catalog 20.

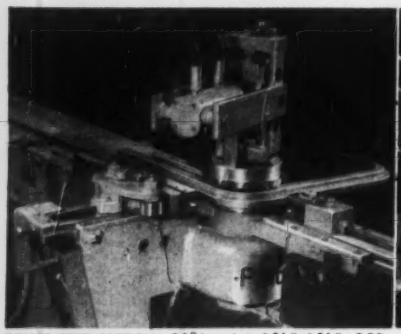
*Registered Trademark

THE GARLOCK PACKING COMPANY, Palmyra, New York

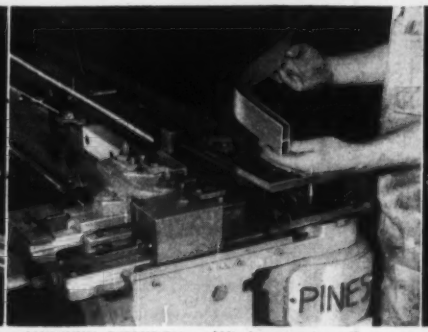
For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U. S. and Canada

GARLOCK

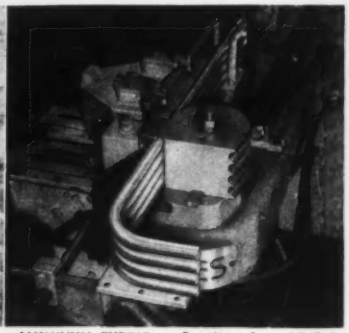
Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products



ROLLED-STEEL SECTION—90° bends in 1¾"x1¾"x.059 stock produce automobile seat frames. Split dies with automatic actuator make possible speeds up to 500 bends per hour.

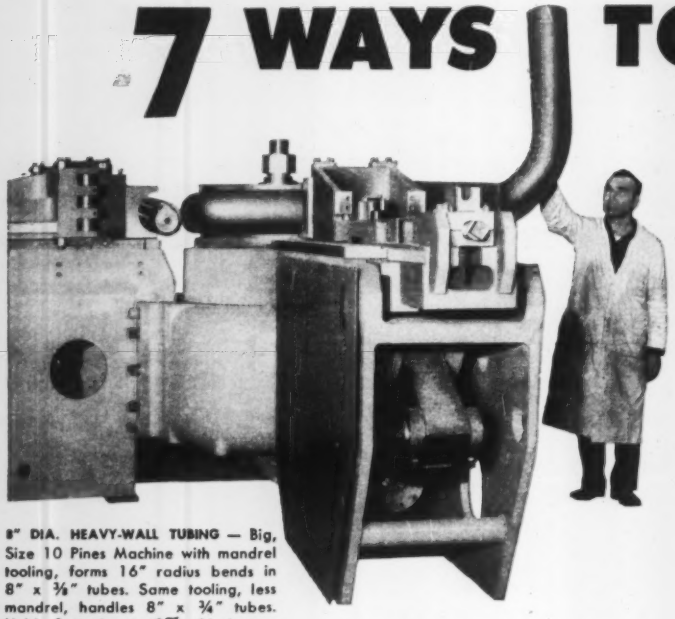


ALUMINUM EXTRUSION — Window awning ribs are accurately formed on a 5¾" inside radius using leaf-spring mandrels. Split-die tooling speeds loading and unloading operations.



ALUMINUM TUBING — Bending four 1" O.D. x .035 workpieces simultaneously on a 3½" CLR produces up to 1200 pieces per hour for large furniture plant.

7 WAYS TO CUT COST Production Bending . . . the "PINES-WAY"



8" DIA. HEAVY-WALL TUBING — Big, Size 10 Pines Machine with mandrel tooling, forms 16" radius bends in 8" x ⅜" tubes. Same tooling, less mandrel, handles 8" x ¾" tubes. Holds flattening to 8%, thinning on outside to 10%.

Hundreds of metalworking plants have found it possible to effect substantial savings by applying Pines Machines in fabricating a wide range of tubing, pipe, extruded or rolled-shaped parts. As illustrated, they are profitably used today on large or small work, and on both short as well as long run jobs. Production-wise and cost-wise, you will find bending the "Pines-Way" is a fast, accurate metal forming method. For assistance with any job or a cost analysis, call on Pines Engineers without obligation.

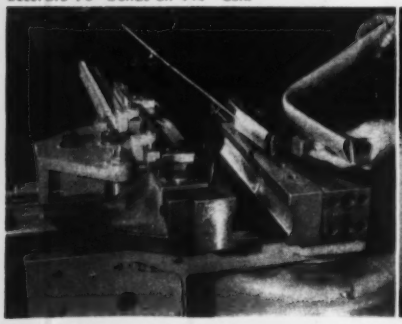
Write **FOR FREE DATA SHEETS**

For additional cost cutting ideas write for free copies of "Pines News" — illustrates latest bending techniques applied to actual jobs.

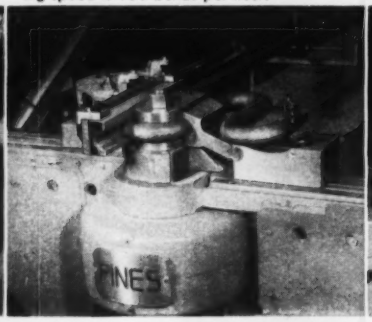
PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery | 662 WALNUT • AURORA, ILLINOIS

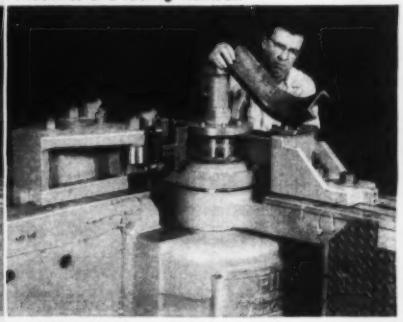
AIRFOIL SHAPE—1 3/16" x 2 1/16" aluminum aircraft struts are now rapidly formed at production speeds. Segmented mandrel and wiper die insure smooth, accurate 90° bends on 4¼" CLR.



HEAT EXCHANGER COILS — This tooling set-up produces accurate 180° serpentine bends in 2" O.D. x .065 tubing on 2½" CLR. Operating speed is 150 bends per hour.



STEEL CHANNELS — Bending heavy 4" x 5.40# steel channels on a 3½" I.R. for truck frames is another example of the versatility and efficiency of Pines Machines and tooling methods.



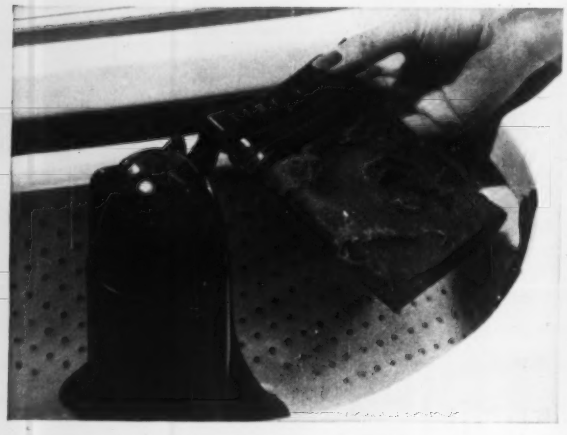
There is no substitute for stainless steel
in automobiles

No other material is as bright, strong and resistant to rust and wear as Stainless Steel. It gives every car the clean, exciting beauty that sells in the showroom and re-sells on the used car lot. Look for *Stainless Steel* on your new automobile.

Specify McLouth high quality sheet and strip Stainless Steel. McLouth Steel Corporation, Detroit 17, Michigan.

McLOUTH STAINLESS STEEL

Inco Nickel Alloys
. . . for wire mesh in severe environments



For corrosion, abrasion resistance

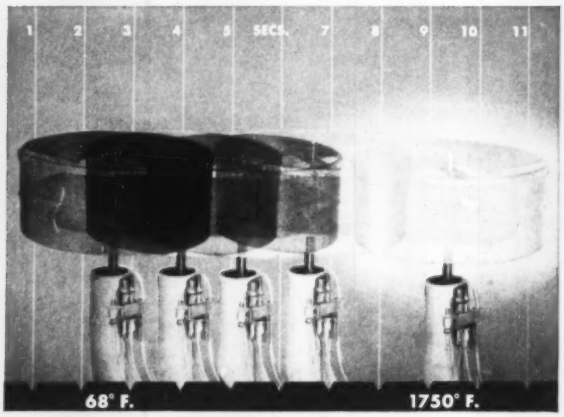
This lint filter is a big reason why housewives buy RCA® Whirlpool automatic washers. Made of a lightweight Monel* nickel-copper alloy mesh, it can withstand practically all household acid and alkaline solutions . . . stands up to clothes grit, too. Monel mesh is easily formed, brazed, welded. And . . . in fine meshes, it's priced especially low.

For high conductance, caustic resistance

The plates in long-lived nickel-cadmium batteries are sintered carbonyl Nickel powder reinforced with nickel wire mesh. Strong Nickel mesh is proof (1) against the high sintering temperatures used in plate manufacture (2) against embrittlement or corrosion from the potassium hydroxide electrolyte (3) against contamination by foreign ions.

For "hot" strength, oxidation resistance

At the Progressive Metal Treating Co., heat-treating trays lasted about 7 months — until they were made of Inconel* nickel-chromium alloy. These trays are used in carburizing, nitriding, annealing of small steel parts. They withstand heating to 1750°F, quenching to 150°F oxidation, in a gas fired furnace. After 30 months, trays are still in daily use.



For cyclical thermal shock

Radiant elements like this are fired from cold to 1750°F in 11 seconds—thousands of times! Incoloy* nickel-iron-chromium alloy element is part of a gas conversion burner made by the Abbott Equipment Co. Incoloy wire mesh stands up to thermal shock, high temperature oxidation and creep. Easy to form, braze, weld. Priced competitively with less durable materials.

*Registered trademark

*Use meshes of Inco Nickel Alloy to improve your product, cut manufacturing costs—check with your wire cloth supplier.***

**Names on request

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N.Y.

INCO NICKEL ALLOYS

GNP, Industrial Output To Jump in 1959

Look for a gross national product of $470 billion in 1959, compared with $436 billion in 1958. We'll experience an annual rate of $462 billion this quarter—$472 billion in the second period, $471 billion in the third three months, and $475 billion in the fourth. Discounting the seasonal slip in July, August, and September, we'll find 1959 a year of steady gains. The Federal Reserve Board's industrial production index should average 147, compared with 134 for 1958. Next December should see the high point at 152. More and more emphasis will go on sales, particularly selling on a technical basis, in the next 12 months (Page 189). Result: Your volume should be up 8 to 10 per cent, on the average.

Your Income To Rise; Prices Fairly Steady

Your personal income should rise again in the coming year; the nation's total will be $373 billion. That compares with $353.5 billion in 1958, a record high despite the recession. Our bulging income is one of the big reasons why the 1957-58 recession was no worse than it was and why we're pulling out of it so rapidly. Prices should be fairly steady in 1959, too—up about 2 per cent for industrial products, but up less than a percentage point generally because of lower food costs. No sensational consumer spending spree is in the offing. Your expenditures will still be fairly high, but not as in 1954-55 when they were a major contribution to our recovery. U. S. manipulation of credit rules is likely to encourage stability in personal outlays.

The Changing Role of Metalworking Managers

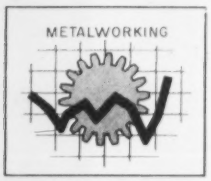
The 1959 expectations for personal income will be 410 per cent above the $72.9 billion that jingled in Americans' jeans in 1939. That's just one of many reminders of the big change this country has undergone the last score of years. To you managers that shift has brought new problems—and new opportunities. Managers in the middle levels, particularly, are more numerous, better trained, more needed to solve questions of productivity, marketing, cost control, labor relations, and profitability (Page 95).

Profits To Climb, But Not Enough

Total corporate profits before taxes will rise in the next 12 months. Watch them hit $46 billion. That compares with only $36 billion in 1958, and $43.5 billion in 1957. Despite the improvement, they'll still be inadequate as

metalworking continues to battle profit erosions from rising labor and other costs, a tight lid on many prices, and inadequate depreciation allowances.

Facts and Figures of the World's Largest Industry



The government's antiquated policies on depreciation are a factor that will keep new plant and equipment spending at disappointing levels in 1959. Expenditures should total $32 billion for the year, up from the so-so $30.5 billion of 1958. As STEEL's records of capital spending show (opposite Page 138), we need sharply increased outlays to have what you can call a boom. One is not in the offing this year.

Peak Employment by March or April

Watch for us to catch up with the 1957 peak employment of 67 million by March or April. But because of the larger labor force, our unemployment will be a little higher and probably won't simmer down to 3 million until the fourth quarter.

Sharpest, Shortest Postwar Recession Is Over

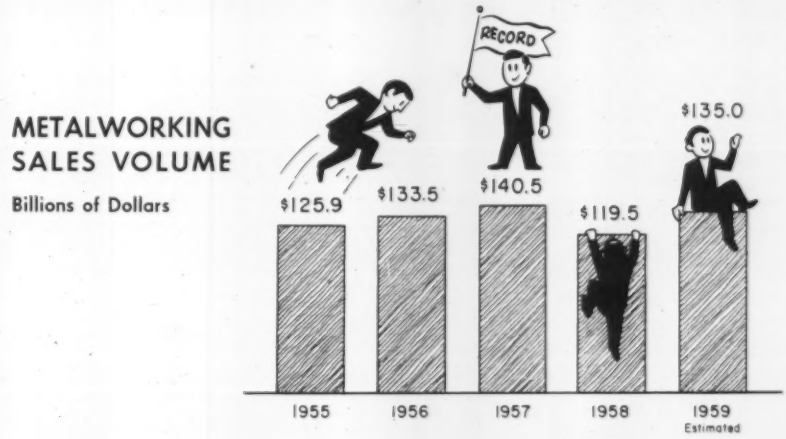
Defense cutbacks of about 50 per cent in mid-1957 probably triggered the 1957-58 recession. Capital spending, steel production, and other key activities were leveling off or going down at that time, and the defense move was the fuse. Of our three recessions since the end of World War II, this one just ending has been the sharpest but the shortest.

Congress Will Spend 7% More

Your Congress this year will be in a spending mood—for defense, to help depressed domestic areas or depressed industries. But it will be kept in tight rein by leaders like Sen. Lyndon Johnson (D., Tex.) who don't want the deficit to go much higher than the whopping $12 billion estimated for fiscal 1959. The Democrats in Congress want some credit for thrift that will be remembered in the Presidential voting of 1960. The result will be that the forces for spending will win out this year—but by a narrow margin. Look for federal spending to rise about 7 per cent in calendar 1959 over 1958. Much of this will be for hard goods or to otherwise help metalworking (Page 108).

What Metalworking Managers Expect

Managers responding to our annual survey tell us that metalworking sales may climb to $135 billion in 1959, much better than last year's performance but still below 1957 (Page 99). Steel production this year will reach 110 million ingot tons, vs. 85 million in 1958. We'll turn it out this way: 27



million tons in the first quarter, 29 million in the second, 24.2 million in the third, and 29.8 million in the fourth. Strike possibilities look ominous, which is why the third quarter may be down so far. Last year was a time of drastic steel inventory liquidations. Now we're starting on the accumulating side of the cycle, speeded both by better business among steel users and by the fear of a strike. Steel stocks are now estimated at about 14 million tons, up 1 million from the low point of last August. By next July 1 (when the current steel labor contract expires), they may reach 19 million tons.

Industry-by-Industry Prospects

Steel consuming industries should fare about this way:

✔ CONSTRUCTION . . .

This hardy perennial, a pace setter ever since World War II, will continue its sky-high ways with a record $53 billion year in 1959. That compares with $49.5 billion in 1958. The highway program is finally shifting to overdrive but could stall if Congress can't decide on how to finance it. However, look for an early solution there. Not so promising is industrial construction, which will have a mediocre year at best. Private and public housing starts should number 1.2 million, compared with 1,160,000 in 1958. Public construction, other than roads, will be high, as will institutional and commercial building.

✔ AUTOMOBILES . . .

At this early point in the 1959 model sales campaign, prospects are still built largely on faith, hope, and charity. If December's good sales of about 500,000 hold up, we'll have a 5.8 million car year in calendar 1959. But the conservatives still stick with 5.5 million—a figure that was considered highly optimistic only two months ago. We'll import about 400,000 this year, but General Motors Corp. and Ford Motor Co. will not introduce their economy cars (Page 119) until fall, the normal introduction time for 1960 models. If 1959 sales slump badly, the Big Two would reconsider that decision. GM could probably introduce its line early next summer if it had to. The automotive industry provides a clear illustration of how a steel consumer's inventory policies can affect the steel industry. Last year in a period of sharp stock liquidation, the automotive buyers took 9.5 million tons of steel to build 4,250,000 cars and 870,000 trucks. This year in a period of sharp stock accumulation, they'll take 14.5 million tons if they build 5.8 mil-

lion cars and 1 million trucks. That's about 50 per cent more steel to build 35 per cent more products.

TRANSPORTATION EQUIPMENT...

The boom-and-bust freight car industry is still in the bust cycle. About 40,000 cars will be turned out this year, compared with 42,000 last year and 101,500 in 1957. Railroad maintenance will be up a little . . . U. S. shipyards turned out (including conversions) a record peacetime 1 million dead weight tons in 1958. Nearly 30 million tons are now under construction, including 34 cargo ships and 80 tankers. In 1959, 32 ships will be launched . . . With 80 per cent of the aircraft-missile industry's sales in military products, it sees 1959 sales at well over $10 billion, compared with $11.8 billion in 1958. The missile backlog isn't increasing as rapidly as the aircraft backlog is dropping.

APPLIANCES AND UTENSILS...

Look for a 10 to 15 per cent increase in unit sales here. The industry ended 1958 with a bang. Because of an inventory policy shift similar to that in autos, manufacturers will take far more steel this year than last—about 2.6 million tons, compared with 2.1 million in 1958.

MACHINERY...

A so-so year is ahead for most types of nonelectrical machinery; a downright poor one is the prospect for machine tool builders. Machine tool sales should reach about $455 million this year, compared with $360 million in 1958. That's far less than half the industry's potential. It has capacity to build more than $1 billion worth of machine tools each 12 months.

ELECTRICAL MACHINERY...

The outlook here is better than in nonelectrical machinery. Look for a 7 per cent gain over 1958. Dampening the optimism is the growing competition from foreign builders, selling both in the U. S. and in our export markets. Machine tool manufacturers have the same trouble.

FARM EQUIPMENT...

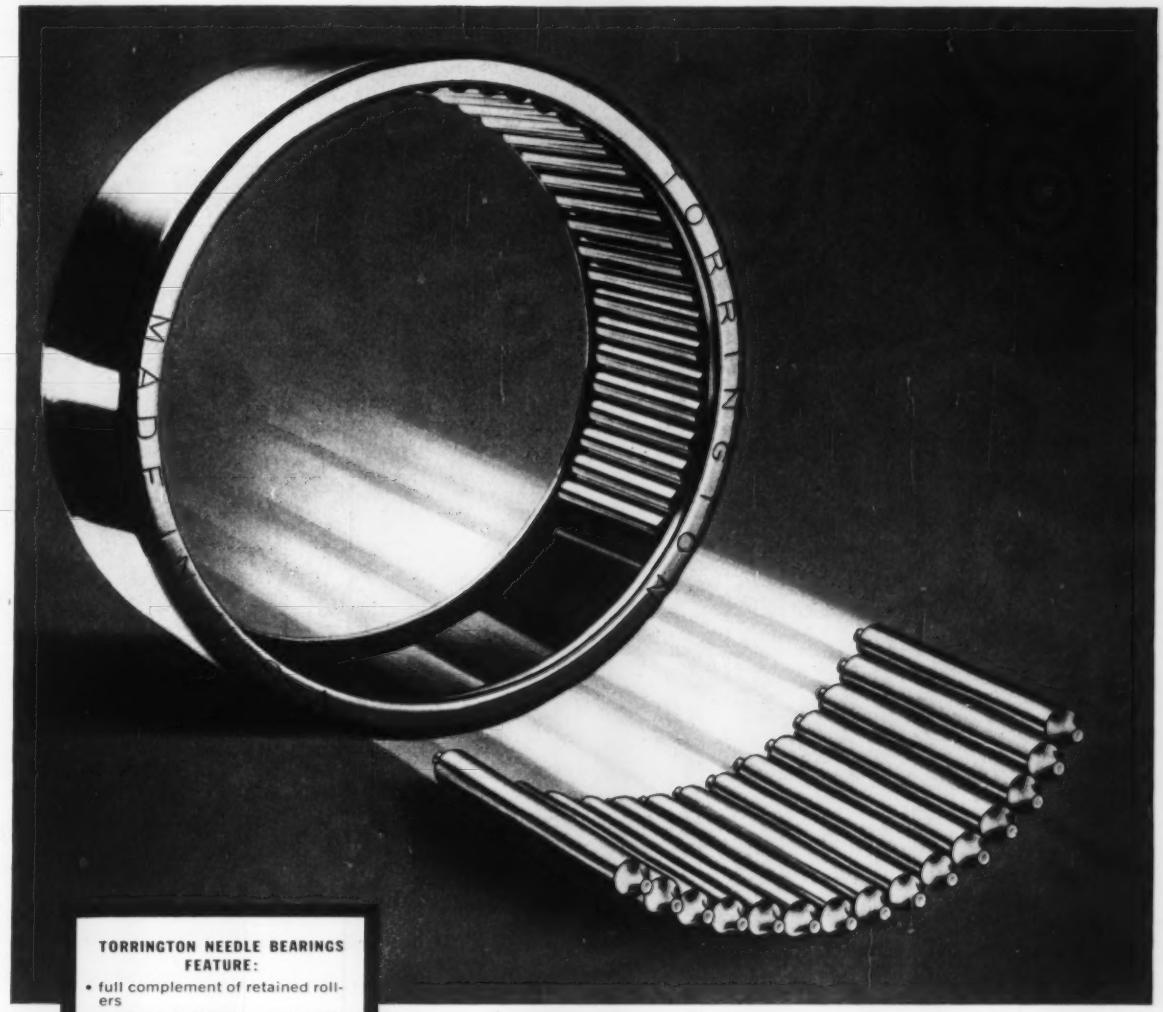
Sales this year will equal or surpass the estimated $2.2 billion harvested in 1958. Last year was the best for farm implement makers since 1951. They were the first to feel this last recession, and they are among the first to plow out of it.

OIL AND GAS EQUIPMENT...

The Supreme Court's reversal of the Memphis decision last month restores the authority of natural gas companies to raise rates without first obtaining the consent of all their customers. Result: Expansion programs will be resumed. Look for 3.4 million tons of pipe to be laid in 1959, vs. 2.6 million in 1958. This year's total won't surpass the 1957 record of 4.2 million tons laid in 1957, but it will be better than the 3.2 million average since 1949. Makers of valves and all the other equipment needed for pipelines expect gains of 15 per cent and more over 1958.

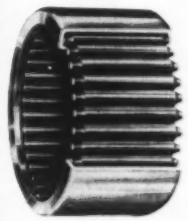
CONTAINERS...

Watch for makers of barrels and drums to boost production 3 per cent in the coming 12 months over output last year. Canmakers will jump 6 per cent in unit volume.



TORRINGTON NEEDLE BEARINGS FEATURE:

- full complement of retained rollers
- unequalled radial load capacity
- low coefficient of starting and running friction
- low unit cost
- long service life
- compactness and light weight
- runs directly on hardened shafts
- permits use of larger and stiffer shafts



Here's Why Torrington Needle Bearings Provide Maximum Radial Load Capacity

The Torrington Needle Bearing's full complement of small diameter rollers provides the largest possible number of bearing contact lines in the load zone.

This feature gives Needle Bearings a higher radial load capacity than any other bearing of comparable size. Precision rollers ensure smooth anti-friction performance with low coefficient of starting and running friction, to match this unequalled capacity. Rollers are positively retained by the turned-in lips of the outer shell, permitting simple, economical installation and assembly.

Torrington experience spans twenty years in design and application of Needle Bearings to equipment of all types. This experience is at your disposal to help you secure the ultimate in performance built into every Torrington Needle Bearing. **The Torrington Company, Torrington, Conn.—and South Bend 21, Ind.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS • THRUST

How the Armco Stainless "Wardrobe" of Finishes Can Help You Save

No matter how they are finished on the outside, Armco Stainless Steels are always the same high-quality, corrosion-resisting steels all the way through. But you can save money by specifying the *one finish* from the Armco Stainless "wardrobe" that best suits your product's needs and requires the fewest additional finishing operations in your plant.

MANY ARMCO FINISHES TO CHOOSE FROM

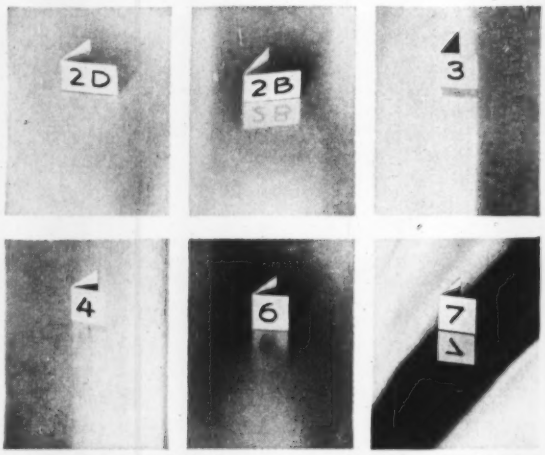
Because they serve in many different products, Armco Stainless Steels are available in a wide variety of surface finishes.

Tough jobs call for workclothes. One of the unpolished surface finishes is generally most economical in high-temperature industrial uses, involving highly oxidizing or very corrosive atmospheres. On the other hand, when appearance, sanitation, or easy cleaning come first, a polished stainless surface is required.

Patented Armco processes offer additional possibilities. Small parts and intricately-shaped pieces can be economically polished by Armco's electropolishing process. Another Armco process "Ebonizes" (blackens) stainless steel parts.

BROAD RANGE OF STAINLESS

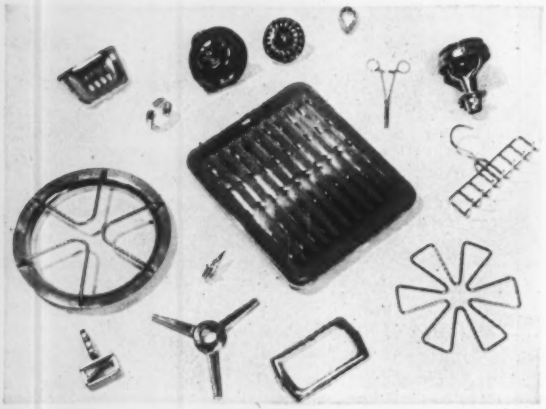
Remember, too, Armco Stainless Steels are available in a wide range of standard and special grades—in gages, sizes, and shapes to suit design needs. For more information about Armco's Stainless Steels or their surface finishes, just fill in and mail the coupon or call your nearest Armco Sales Office.



Pictured are six of the eight mill finishes available on Armco Stainless Steels. No. 2B and No. 2D Sheet Finishes correspond to No. 1 and No. 2 Strip Finishes, respectively. Not shown are the hot-rolled, annealed and pickled No. 1 Sheet Finish for industrial products and the new Armco **SOFTONE** Finish for Type 430 Stainless Steel strip. SOFTONE was developed to provide a soft, lustrous surface, yet avoid mirror-like reflectivity.

Here's a demonstration of the durability of the blackened finish produced on stainless steel by the Armco Ebonizing Process. After 10 years' exposure in a mild industrial atmosphere, a simple waxing (upper part) brings out the full finish beauty of this Ebonized sample.

Small or intricately-shaped stainless pieces like these can be economically polished by the Armco Electropolishing Process.



New steels are born at Armco

ARMCO STEEL CORPORATION, 1109 Curtis St., Middletown, Ohio

I would like more information about:

☐ Armco Stainless Steels

☐ These Armco Stainless finishes_____,

_____,

_____,

NAME _____

FIRM _____

STREET _____

CITY _____ ZONE _____ STATE _____

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

Your Problems in 1959

As the new year gets underway, it is a good time to take a look at the problems which will have some bearing on the primary objective of every business enterprise: Making a profit.

We have the assurance that 1959 will be a good year. Estimated metalworking sales of $135 billion will be up 10 per cent from $120 billion in 1958 and down less than 4 per cent from the record of $140 billion in 1957.

We also have assurance that markets will continue to expand—and at a rate greater than most people anticipated. In 1955, the Census Bureau figured our population would be 221.5 million in 1975. Now it has revised its estimate to 235.2 million.

But despite our growth in population and markets, we will still have a number of problems:

Concentration of union power in an unregulated monopoly so strong it can cripple entire industries and win the election of political candidates.

Continued federal deficit financing as the sputnik war grows hotter.

Increasing burden of state and local taxes and the dim prospects for tax reform at the federal level.

Financing plant expansion as rising wages and price competition put the squeeze on profits and making borrowing and equity financing more difficult.

Changing markets and technologies that often render products obsolete and unsalable overnight.

Inflation that has reduced the value of the dollar by one-half in 20 years.

Since the profit motive is the foundation of the free enterprise system, everyone (whether in labor, management, or government) has a stake in finding solutions to those mutual problems.

Irwin H. Such

EDITOR-IN-CHIEF

MILWAUKEE WROT WASHERS

...now they're WASHED!

SINCE 1887

Quality-conscious production methods call for modern materials . . . even down to your nut-and-bolt assemblies. Now you can buy Milwaukee WASHED WASHERS to promote cleaner workmanship, cleaner product-assembly, and upgrade the morale of production workers through a thoughtful regard for personal cleanliness.

Today, all popular sizes of Milwaukee U. S. Standard and S.A.E. Washers, Rivet Burrs and Machinery Bushings are *washed* by a special process that removes all oil, graphite or other grime. In addition, this *Milwaukee Wrot Washer washing process includes rust resistant treatment.*

Since the introduction of this improved processing of Milwaukee Wrot Washers, Industry has responded with a most enthusiastic vote of approval. Many production orders *specify* "WASHED WASHERS" . . . but whether you specify "Washed" or not, that's the way they are supplied . . . clean washers for clean workmanship and clean workers . . . to match your highest production standards.

Specify "Milwaukee Wrot Washers" for better Quality Control.

plus...

Modern Packaging for Easier Identification

In keeping with a policy of "dressing up" the washers themselves, by our special washing process, they are now put up in convenient, attractive 1-lb. and 5-lb. packages for easier identification and handling.

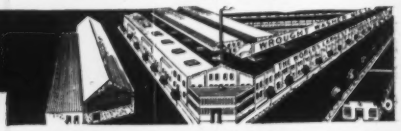
Your No. 1 Source for Quality Washers

A8-9615

WROUGHT WASHER MFG. CO.

THE WORLD'S LARGEST PRODUCER OF WASHERS

2103 SOUTH BAY STREET • MILWAUKEE 7, WISCONSIN



The Changing Role of Metalworking Managers

IN 1939, 131 million people lived in these United States. In 1959, our population will rise to 176.8 million.

IN 1939, we had a gross national product of $91.1 billion. In 1959, our GNP could reach $470 billion.

IN 1939, the metalworking industry chalked up sales of $17.7 billion. They will hit $135 billion in 1959.

IN 1939, the steel industry produced 52.8 million tons of steel. In 1959, 110 million tons will be turned out.

IN 1939, the average family income was $1850. In 1959, it will be $6400.

The economy has changed as much as the powerplant in your car. Your '59 model has about four times the horsepower of your '39. You could change the sparkplugs and make minor adjustments on the '39 yourself. The '59 challenges the most skilled mechanic.

But the '59 runs with far greater smoothness, acceleration, and power than your '39—provided it is properly tuned. The comparison holds true for our economy.

In 20 years, we have moved from an era of scarcity to one of abundance. But today we need greater skill to keep our economic machine adjusted. Your major role as a manager is to help keep it in tune so that the abundance is divided equitably.

Your role is changing because America is changing. Of the many ways your job and responsibilities have shifted, six stand out:

1. You're a Professional

The growing complexity of the economy necessitates more specialists to run it—more managers, particularly in the middle levels of administration, production, engineering, and purchasing. You in that stratum are the new professionals—as far removed from the old seat-of-the-pants salesman, straw boss, mechanic, or buyer as a doctor is from the barber-surgeon.

Harvard Business School and dozens like it provide your graduate training just as medical schools prepare our doctors. The American Management Association is to the professional manager what the American Medical Association is to the doctor. The Harvard Business School and American Management Association have had their

The Changing Economy...

	1939	1959	INCREASE
Population	131 million	177 million	**35%**
Civilian Labor Force	55 million	69 million	**25%**
Total Employment	45.8 million	65.8 million	**43%**
Manufacturing Employment	10.1 million	16.5 million	**63%**
Metalworking Employment	3.3 million	6.9 million	**109%**
Wholesale Price Index (1947-49 = 100)	50.1	121.5	**142%**
Personal Income	$72.9 billion	$373 billion	**410%**
Steel Industry Hourly Wage (min.)	62½¢	$1.96	**213%**
Manufacturing Hourly Earnings (avg)	63-1/3¢	$2.20	**247%**
Family Income (annual avg)	$1,850	$6,400	**245%**
Aluminum Production (tons)	163,545	1.8 million	**1000%**
Copper Production (tons)	712, 675	1.2 million	**68%**
Steel Capacity (tons)	81.8 million	146.5 million	**79%**
Steel Production (tons)	52.8 million	110 million	**108%**
Gross National Product	$91 billion	$470 billion	**416%**
Metalworking Sales	$18 billion	$135 billion	**650%**
Capital Goods Expenditures	$5.5 billion	$32.8 billion	**496%**
Passenger Car Output	2.9 million	5.5 million	**89%**

great growths since 1939. The professional manager has arrived.

2. You're a Communicator

Consider the case of Thompson Ramo Wooldridge Inc. It started life as a maker of automotive parts. It still makes them, but now it's also in aircraft, electronic hardware, and space age technology. It started out being managed from Cleveland. Now its chairman operates primarily out of that city, but its president is headquartered 2000 miles away in Los Angeles.

While distance makes communicating more difficult than it was in 1939, just plain growth has added most to your problems as a communicator. Thompson had 3900 employees and sales of $16 million in 1939. Today, it has 20,000 workers, and its sales will exceed $330 million this year.

3. You Seek New Knowledge

Jointly owned companies are far more numerous now than they were in the 1930s because of the growing need for new knowledge. Sylvania-Corning Nuclear Corp., owned by Sylvania Electric Products Inc. and Corning Glass Works, is typical. Sylvania and Corning pooled managerial skills and knowledge to form a company in a new business, the manufacture of fuel elements. Thompson is another example of a company requiring its managers to know new technologies. It's still a supplier, strictly speaking, for vehicles, but how the means of propulsion have changed!

4. You Have Wider Knowledge

This is the age of the diversified organization, the age of the H. K. Porter Company Inc. that makes items ranging from steel to saws.

As a marketing man, you may have to make a decision about turret lathes in January, construction equipment in February, textile machinery in March—not a far-fetched example in the case of Warner & Swasey Co. Inc.

Diversification was practiced long before 1939 but never to the extent that it is now. Managers have also had to diversify their talents to an unprecedented degree.

5. You're a Pioneer

If you aren't diversifying into widely varying products, you may be called upon to help pioneer products related to your business. And they are increasingly important.

Eighty per cent of Radio Corp. of America's current business comes from products and services not on the market 11 years ago.

And where do those product ideas come from? Largely from you—managers in administration, production, engineering, and purchasing.

6. You're on Guard

Vigilance—to be abreast of technical change, product developments, marketing movements—has always been a must, but never more so than in this jet age.

Take the matter of forecasting. Population growth is a central factor in predicting economic trends. In 1950, the Census experts thought that population would reach 193 million by 1975. By 1955, they jacked up their estimate to 221.5 million. Now, they have raised the ante again. They expect a population of 235.2 million by 1975. So as a forecaster, you have to be aware of America's fertility. Then you have to relate that information to your business.

Nor is it enough to know total population gains. You also have to be on guard to figure where people will be living and what kinds of goods they will be wanting.

You are doing what the managers of a 60-man shop (Fischer Special Mfg. Co., Cincinnati) did. They changed their product mix from a general line of screw machine products to a complete line of milled aluminum and brass nuts because market surveys showed that few other companies were supplying customers the complete line, exactly where and when they wanted it.

The payoff will come for you, too, when you are on guard constantly.

So, the changing times have made you a professional manager, a vigilant pioneer—more skilled in communications, possessing more knowledge, needing more information and skills than your counterparts in the 1930s and earlier. Managerial teamwork is also more common now. You must pool talents to get all the necessary attributes.

As the economy has grown, as products have multiplied, as technology has become more complex, you have become more essential. No one chairman, president, or executive vice president can know all that has to be known to operate large, medium, or even many small companies today. You supply the knowledge, advice, and knowhow upon which top management relies in making its decisions.

You have also increased in numbers. Metalworking will turn out 240 per cent more in physical volume in 1959 than it did in 1939. But only 115 per cent more production workers are doing the job. We're finding that one of the best ways to get more work out of fewer people is to provide more and better supervision. That trend is just starting. Greater automation will put less emphasis on workers who can operate machines and more on people who can manage them.

Dilemma of Inflation

Managers have done amazingly well to adapt to and solve new problems. But so many difficulties have appeared that you haven't found answers to all. The major riddle is inflation.

Hear U. S. Steel Corp.'s Robert Tyson: "As long as nationwide wage inflation continues at rates exceeding the increase in productivity, a price inflation will be compelled."

Inflation is at the bottom of these eight problems you must deal with in 1959 and beyond:

1. Improving Productivity

Here's what happens when productivity improves faster than wages. Productivity went up 6.6 per cent per year from 1919 through 1928, when wages rose only 1.8 per cent annually. Result: Prices dropped 3 per cent each year. Productivity jumped 1.7 per cent a year from 1929 through 1938, and wages rose only 1.1 per cent each 12 months. Result: Prices dipped 1.8 per cent annually.

But from 1939 through 1946, productivity rose only 0.1 per cent yearly, while wages jumped 9.2 per cent every year. Result: The worst inflation of the century. Prices rose 5.6 per cent a year. The 1947-56 decade was also on the debit side, with prices climbing 2.8 per cent per year as productivity rose 3.9 per cent and wages climbed 6 per cent annually.

You managers have to play the role of productivity experts as you never have played it before.

2. Keeping Wages in Line

The lesson of the last 40 years is clear: When wage boosts outrun productivity improvements, we get inflation. When the productivity increases match or exceed pay gains, we have stable prices.

Your job is to hold the pay gains to no more

than the boosts in productivity, a task at which you have failed in the last 20 years.

The decline of the owner-manager has also enhanced union power. You professional managers have not yet found a substitute for the historical close relationship between owner and employees. Workers have turned to unions.

3. Giving More Public Service

One way to get closer to bluecollar people who work for you and probably live in your area is to spend more spare time in public service. That means soliciting for your community fund, or serving on your town council or school board, or participating in politics on the community level (and "community" is as broad as your horizons).

Besides contributing to closer relations with your people, public service can lead to greater influence for more equitable labor-management legislation.

4. Meeting Foreign Competition

European workers get paid only as much as our hourly people get in fringe benefits. No wonder our wage inflation is at the core of our problems in meeting foreign competition.

We have always had such trade competition, but the 1959 variety will be far different and far more serious than the type of the 1930s. Bicycle makers, watch manufacturers, and shipbuilders have lost virtually all their export business and much of their domestic volume to foreign competitors.

Machine tool builders and steel wire manufacturers face a similar fate. What can be done? Tariffs haven't worked too well. Subsidies are repugnant to all believers in free enterprise. Until the rest of the world's wage rates move closer to ours, you managers will have to rely on harder selling, higher quality, and superior technology to merely keep even with foreign competition.

5. Keeping Pace with Technology

Superior technological improvements can go a long way toward pushing productivity higher and stemming inflation.

Are you taking advantage of explosive forming, chemical milling, numerical control—or any of the other new production techniques bursting forth in this sputnik age? New alloys are legion. Even new basic metals are commercially available.

6. Increasing Research, Development

Besides keeping pace with technology, you can help your cause by developing new materials and new techniques. A recent nine-industry survey showed: The top three industries spent an average of 5.7 per cent of sales for research and development; they had a 52 per cent profit gain in a ten-year period. The middle three spent 0.9 per cent; they picked up 9 per cent in profits. The bottom three spent 0.2 per cent; they had a 3 per cent profit loss.

For the long pull, that's the best way you can find to improve productivity.

7. Improving Marketing

Too many managers handle marketing as they did in 1939, when metalworking sales came to only $17.7 billion. More sales mean more production and lower per unit costs. In 1959, you should be geared for a dollar volume seven to eight times the 1939 level.

If you're not doing that well, your managerial productivity is subpar.

8. Plugging Slow Cost Leaks

Here's a way to cut costs (and stem inflation) that's often neglected because it's so humdrum. But the leaky faucet can "nickel" you to death. Find those unglamorous wastes like excessive tool breakage, expensive sales calls, or even dripping water.

Conclusion

In just one year, you won't solve inflation or the eight corallary problems we have outlined. But you should make a start in 1959 to realize the promise of the soaring sixties and seventies.

In 1959, we'll produce 110 million tons of steel. In 1975, we'll need 250 million.

In 1959, we'll have 176.8 million people. In 1975, we'll have 235 million.

In 1959, our metalworking industry's sales will hit $135 billion. They should reach $372 billion by 1975.

This is no time for little plans. This is a threshold year. Let's make a good entrance.

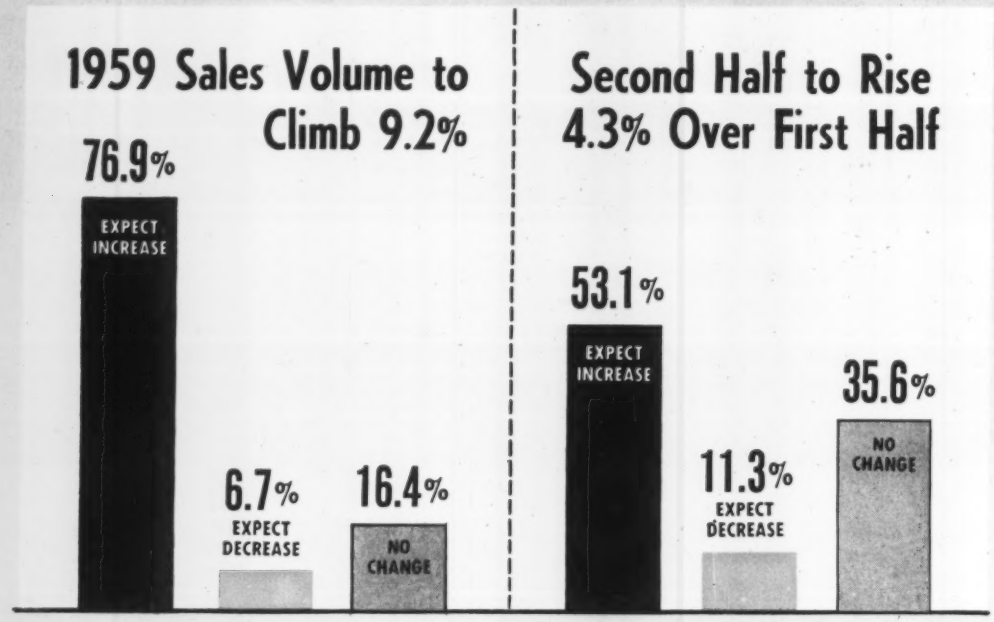
• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

STEEL
JANUARY 5, 1959

METALWORKING MANAGERS EXPECT

9.2% More Sales In 1959

The editors of STEEL have found that one of the best indicators of the business trend in metalworking is the forward thinking of the men who manage the plants. So STEEL asked the general managers of 7500 metalworking plants what they expect in 1959—in production, prices, costs, profits, employment, research, new products, and capital expenditures. Their answers will aid you in your planning.



INCREASES EXPECTED IN SALES VOLUME DURING 1959

	1959 vs. 1958	2nd half vs. 1st half
Analysis by Size of Plant:		
Plants employing 20-99	9.0%	4.0%
Plants employing 100-499	9.1%	4.7%
Plants employing 500 or more	9.8%	4.9%
By Major Industry Groups:		
S.I.C. 33—Primary metals	11.3%	2.5%
S.I.C. 34—Fabricated metal products	7.4%	4.3%
S.I.C. 35—Machinery (except electrical)	10.1%	4.6%
S.I.C. 36—Electrical machinery	9.1%	5.0%
S.I.C. 37—Transportation	10.4%	3.8%
S.I.C. 38—Instruments, related products	9.5%	5.5%
Other metalworking groups*	11.3%	5.1%

*S.I.C. 19, 25, and 39.

METALWORKING'S dollar sales this year will be 9.2 per cent higher than they were in 1958. The second half will be better than the first.

- Profits will rise 6.1 per cent.
- Manufacturing costs will continue to climb.
- Selling prices will go up 2.4 per cent.
- Many more workers will be employed.
- Research spending will increase.
- Capacity will be expanded 2.6 per cent.
- Many new products will be introduced.
- Export sales will inch upward.
- Marketing will get added emphasis.
- Productivity improvement will be a prime goal.

That's the thinking of a majority of the nation's plant managers who participated in STEEL's annual survey of business expectations.

But their optimism is tempered by mounting foreign competition, accelerating inflation, fear of a steel strike (and another price hike), the growing power of organized labor, high taxes, and the relentless cost-price squeeze. The net result will be a vigorous, but uneasy, recovery.

• **A Good Year**—Almost eight of every ten managers replying to this year's questionnaire expect their dollar sales to be higher in '59 than they were in 1958. Only about 1 in 15 anticipates a lower volume.

The respondents predict an improvement of 9.2

Employment To Be 4.2% Higher

SKILLED WORKER OUTLOOK

7.3% EXPECT SHORTAGE

UNIT WAGE COSTS

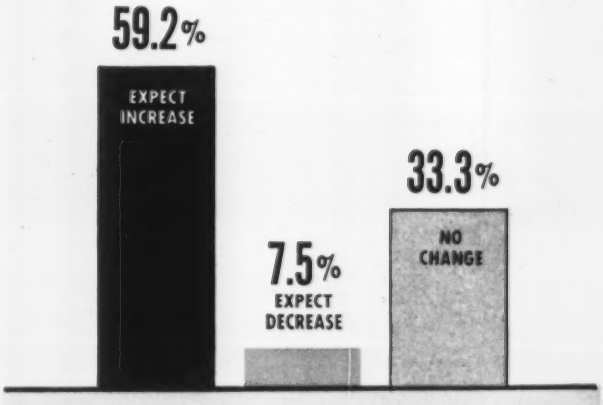
81.3% EXPECT INCREASE

5.6% EXPECT DECREASE

13.2% EXPECT NO CHANGE

WHY UNIT WAGE COSTS WILL CHANGE:	Per Cent of Plants*
More overtime	15.3%
Higher rates	74.5%
Lower productivity	5.8%
Less overtime	3.9%
Lower rates	0.3%
Higher productivity	12.4%
Other factors	1.7%

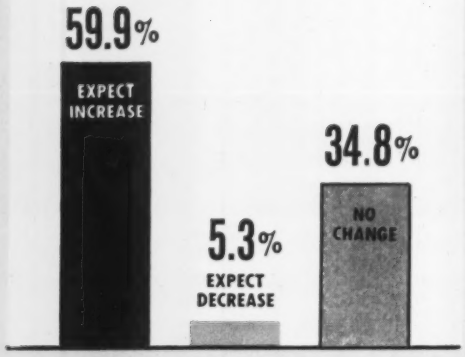
*Figures add to more than 100% because many plants checked more than one factor.



Analysis by Size of Plant:	INCREASE EXPECTED
Plants employing 20-99	4.4%
Plants employing 100-499	4.0%
Plants employing 500 or more	3.7%
By Major Industry Groups:	
S.I.C. 33—Primary metals	4.3%
S.I.C. 34—Fabricated metal products	3.1%
S.I.C. 35—Machinery (except electrical)	5.5%
S.I.C. 36—Electrical machinery	3.9%
S.I.C. 37—Transportation	4.3%
S.I.C. 38—Instruments, related products	5.6%
Other metalworking groups*	2.0%

*S.I.C. 19, 25, and 39.

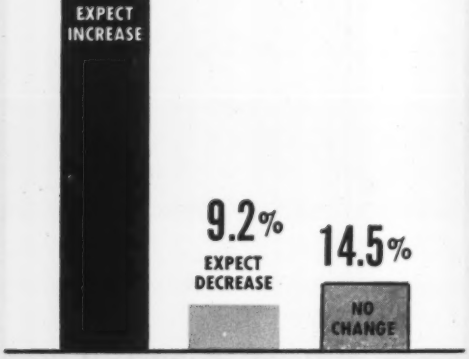
SELLING PRICES
Up 2.4%
(NET INCREASE)



Analysis by Size of Plant:	INCREASE EXPECTED
Plants employing 20-99	2.4%
Plants employing 100-499	2.4%
Plants employing 500 or more	2.5%
By Major Industry Groups:	
S.I.C. 33—Primary metals	3.0%
S.I.C. 34—Fabricated metal products	2.5%
S.I.C. 35—Machinery (except electrical)	2.7%
S.I.C. 36—Electrical machinery	1.5%
S.I.C. 37—Transportation	2.4%
S.I.C. 38—Instruments, related products	1.1%
Other metalworking groups*	2.3%

*S.I.C. 19, 25, and 39.

Manufacturing Costs
Up 2.9%
(NET INCREASE)



Analysis by Size of Plant:	INCREASE EXPECTED
Plants employing 20-99	3.2%
Plants employing 100-499	2.5%
Plants employing 500 or more	2.4%
By Major Industry Groups:	
S.I.C. 33—Primary metals	3.3%
S.I.C. 34—Fabricated metal products	3.2%
S.I.C. 35—Machinery (except electrical)	3.2%
S.I.C. 36—Electrical machinery	1.9%
S.I.C. 37—Transportation	2.7%
S.I.C. 38—Instruments, related products	1.8%
Other metalworking groups*	1.7%

*S.I.C. 19, 25, and 39.

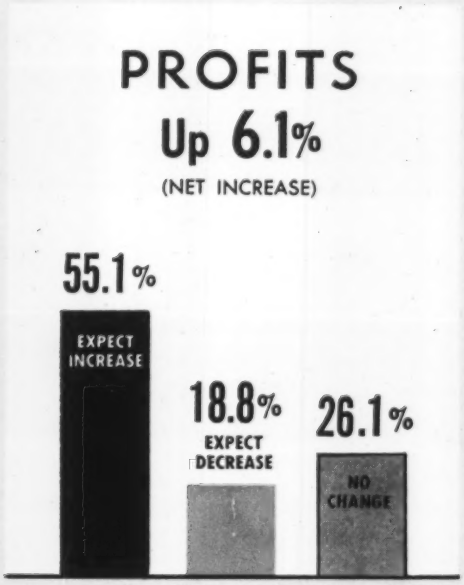
per cent over last year's estimated $119.5 billion volume of metalworking sales. So a $130.5 billion year looks like a good bet. But many of the managers term their estimates conservative. Some top executives look for sales to hit $135 billion this year. It means metalworking will regain more than half—perhaps three-fourths—of its recession losses.

• **Breakdown**—Expectations for sales gains are remarkably uniform through all industry groups, signaling a broadly based uptrend. Primary metal producers are the most optimistic. They'll have a $25.3 billion year (vs. $22.7 billion in '58, $27.9 billion in '57) if they realize their prediction.

The transportation equipment and nonelectrical machinery industries look for their dollar volumes to advance more than 10 per cent. Rising automobile sales will be the heftiest factor in an anticipated $34.4 billion year for the transportation equipment group. That's $3.3 billion above last year's mark.

• **Record Expected** — Manufacturers of fabricated metal products look for the smallest percentage gain. But the average plant in the group expects 7.4 per cent more sales than it had last year. That indicates a record year for S.I.C. category No. 34.

Makers of instruments and related products predict they'll come within $15 million of their 1957 industry volume ($3.3 billion). Last year's mark: $3 billion.



Analysis by Size of Plant:	INCREASE EXPECTED
Plants employing 20-99	4.8%
Plants employing 100-499	6.4%
Plants employing 500 or more	10.8%
By Major Industry Groups:	
S.I.C. 33—Primary metals	8.7%
S.I.C. 34—Fabricated metal products	4.9%
S.I.C. 35—Machinery (except electrical)	1.6%
S.I.C. 36—Electrical machinery	5.2%
S.I.C. 37—Transportation	5.6%
S.I.C. 38—Instruments, related products	7.1%
Other metalworking groups*	2.1%

*S.I.C. 19, 25, and 39.

• **Strong Influence**—A large number of the managers mention construction as one of the brightest spots in the 1959 outlook. They predict near-record volumes in housing starts and public building construction. They look for industrial construction to be unspectacular but healthy. Several respondents credit the road building program for predicted sales hikes. A maker of paint spraying equipment expects "increased activity due to suburban development projects."

"The Supreme Court's reversal of the Memphis Case greatly improves our outlook," reports a valve-maker who anticipates a sales increase of "at least 10 per cent." His comment is typical of oil country suppliers.

• **Defensework**—One-third of the plants surveyed are engaged in defense production. They expect Uncle Sam to buy 4 per cent more of their products this year than last. But some say defensework is becoming less lucrative because of "ever closer tolerances," "tighter controls," "a monstrous amount of paperwork," and "this devilish renegotiation." Nuclear activity is mentioned by several as an expanding market.

• **Profits Still Lag**—Eight of ten managers expect their after-tax profits this year to equal or exceed 1958's. But they don't look for profit gains commensurate with sales increases. Small plants are especially pessimistic; they look for profits to advance less than 5 per cent on 9 per cent greater sales. Two frequently mentioned reasons: Rising employment costs and keen price competition. Taxes also are blamed. Executives of small plants are divided on whether the new Congress will work to their advantage.

• **Price Problems**—"Our prices are lower than they were three years ago," complains a wire goods manufacturer. "Our profits will drop because we can't boost prices to cover wage increases," says a producer of pressure tanks. "Our prices are at rock bottom, and we're being undersold," laments a Michigan tool and die maker.

An unprecedented number of respondents call price competition their number one problem. Reports come from machinery producers, gray iron foundries, structural steel fabricators, instrument makers, appliance people, and executives in a host of other industries.

But other respondents say they'll have no part of a price war. This assertion by the president of a jobbing foundry is typical: "We're quoting prices that guarantee us a decent profit. We're selling on service, quality, and delivery. It's a lot tougher, and we lose some sizable jobs, but we believe it will pay off in the long run."

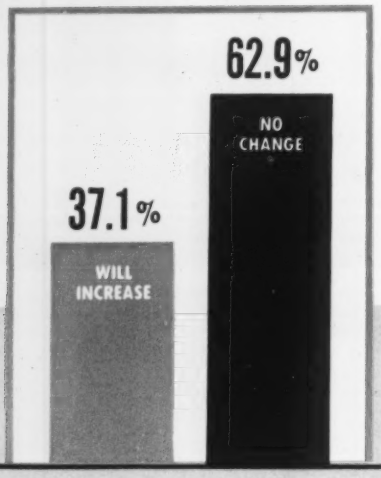
The managers predict metalworking prices will average 2.4 per cent higher this year than last, with the biggest hikes coming in primary metals and machinery (except electrical).

• **Labor Is Censured**—David J. McDonald, USW president, Walter Reuther, UAW chief, and James Hoffa, Teamsters' union boss, are the objects of some unkind remarks in this year's survey. The respondents are alarmed by the tendency of employment costs to outrun productivity increases. Coupled with competitive pricing, it spells profit problems.

A Pennsylvania metal stamper fears a profit shrinkage this year because "employment costs are rising faster than they can be offset via better methods and higher prices."

Nearly one-third of the comments on labor troubles came from Michigan manufacturers. Two say they

WHAT METALWORKING MANAGERS EXPECT



Production Capacity Will Be Hiked 2.6%

	OF THOSE EXPECTING TO INCREASE			
	9.5% WILL BUILD NEW PLANTS	34.5% WILL BUILD ADDITIONS	70.1% WILL BUY EQUIPMENT	2.6% NET INCREASE
Analysis by Size of Plant:				
Plants employing 20-99	7.6%	32.3%	68.9%	2.5%
Plants employing 100-499	8.6%	37.9%	72.9%	2.6%
Plants employing 500 or more	20.0%	36.2%	68.9%	2.7%
By Major Industry Groups:				
S.I.C. 33—Primary metals	10.3%	30.9%	79.1%	3.9%
S.I.C. 34—Fabricated metal products	8.9%	31.6%	73.2%	2.8%
S.I.C. 35—Machinery (except electrical)	9.3%	35.3%	63.3%	2.2%
S.I.C. 36—Electrical machinery	8.4%	36.6%	71.0%	3.2%
S.I.C. 37—Transportation	10.6%	40.7%	65.3%	2.8%
S.I.C. 38—Instruments, related products	3.2%	36.4%	74.7%	3.0%
Other metalworking groups*	17.2%	36.8%	69.4%	1.6%

*S.I.C. 19, 25, and 39.

are relocating "in a southern state that has a right-to-work law." Several others report they are considering such a move. A heat treater reports his "customers are moving out of state."

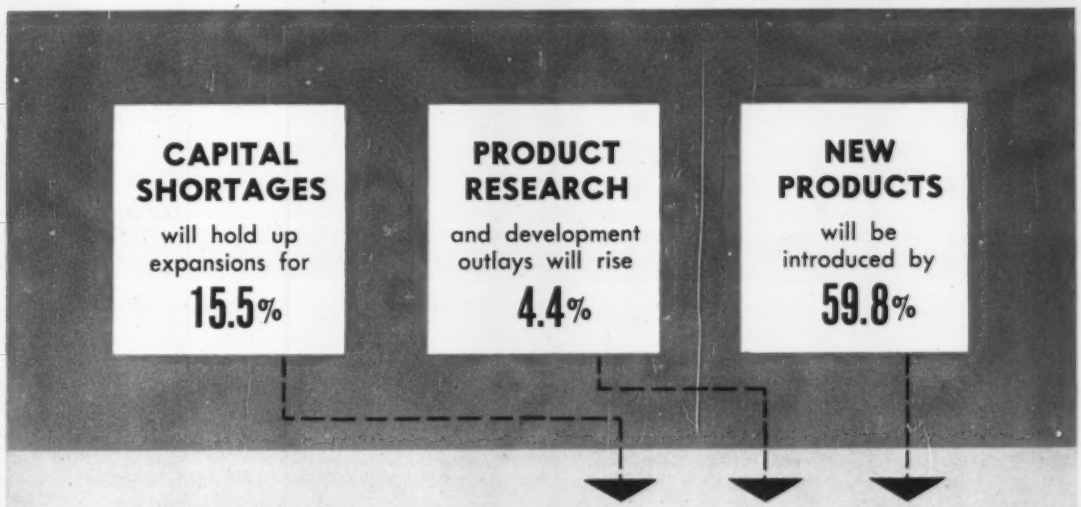
Some respondents lay the blame for the wage spiral on Big Steel and Big Autos. Others echo this thought offered by the president of a porcelain enameling company: "It should be every manager's responsibility in 1959 to resist labor demands and concentrate on improving the efficiency of production." Another respondent suggests that management can help halt the wage-price spiral by "taking a more active part in politics."

One respondent asserts: "Our fringe benefit costs are higher than the total employment costs of our foreign competitors."

• **Imports Cause Alarm**—Foreign competition is listed as problem number one by a hefty percentage of the respondents. Western Europe, Japan, and even Communist dominated nations are flooding U. S. markets with a wide assortment of metal products which sell at bargain prices, the managers report. Imported steel is being offered in the Midwest at prices below U. S. producers' costs.

The threat from abroad is no longer limited to a few items, like toys, bicycles, wire goods, and cameras. Machine tool builders, auto suppliers, producers of oil country goods, instrument makers, and a host of other metalmen say competitive imports are being peddled right in their own backyards. Source of alarm to many managers: Foreign producers are narrowing the quality gap between their goods and those made in the U. S.

Foreign competition in export markets is even broader and more severe, the managers report. They look for metalworking's dollar volume of exports to climb only 1.9 per cent above 1958's unimpressive showing. To compete in export markets, they'll extend more credit, visit more foreign customers, design products for export markets, participate in trade



Analysis by Size of Plant:			
Plants employing 20-99	19.4%	3.6%	55.3%
Plants employing 100-499	12.4%	4.8%	63.0%
Plants employing 500 or more	6.6%	6.4%	71.1%
By Major Industry Groups:			
S.I.C. 33—Primary metals	16.1%	2.7%	31.2%
S.I.C. 34—Fabricated metal products	16.4%	3.3%	50.2%
S.I.C. 35—Machinery (except electrical)	17.2%	4.6%	66.7%
S.I.C. 36—Electrical machinery	14.9%	6.3%	82.6%
S.I.C. 37—Transportation	9.0%	5.1%	50.8%
S.I.C. 38—Instruments, related products	7.1%	6.8%	86.8%
Other metalworking groups*	16.2%	5.2%	70.5%

*S.I.C. 19, 25, and 39.

fairs, reduce prices, and work more closely with foreign distributors.

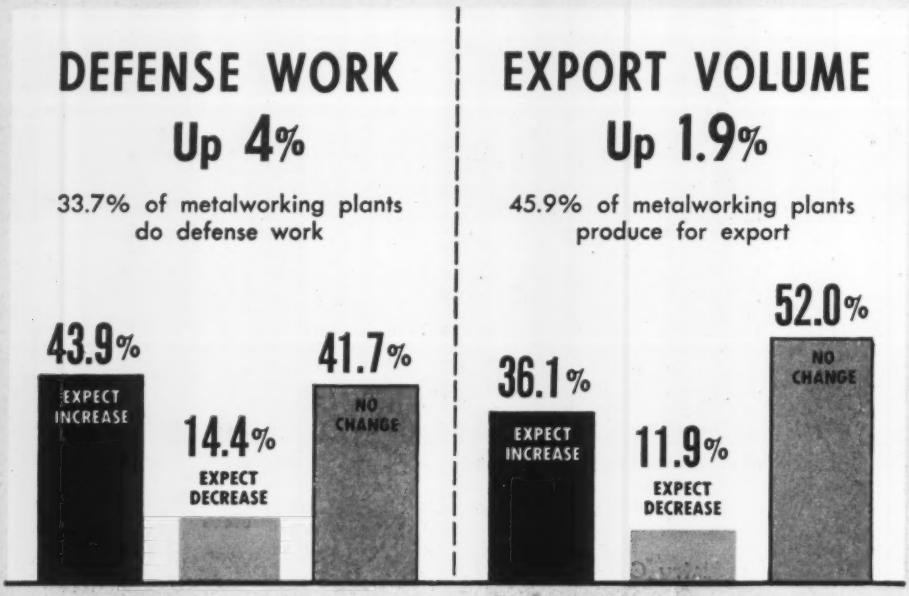
• **Plant Expansion** — Another problem frequently mentioned by respondents is a lack of funds needed to purchase new equipment. Capital shortages will curtail planned expansions for one out of six metalworkers. Excess capacity burdens others. Several say changes in depreciation laws are urgently needed.

Despite such difficulties, metalworking capacity will be boosted 2.6 per cent this year. Primary metal producers will hike theirs the most—3.9 per cent. Equipment additions will account for a major portion of the over-all advance.

• **Research Outlays Up**—Product research and development expenditures will set a record again this year. Only 2 per cent of the respondents will reduce their outlays. The instrument and electrical machinery industries will fatten R&D budgets the most. More than half the plants employing 500 or more will hike their outlays.

These comments summarize the main reasons for the boosts: 1. "We want to be ready for the new boom"—Rhode Island partmaker. 2. "Exclusive designs always boost demand"—New England manufacturer of consumer goods. 3. "Higher quality will help us sell in today's competitive market"—electric battery maker. 4. "Redesign will lower our manufacturing costs"—midwestern machinery producer. 5. "We need a broader product line"—Michigan auto supplier. 6. "We plan to enter new markets"—Tennessee foundry.

• **Strike Feared**—Several respondents says a prolonged steel strike would hold their 1959 production below what they now estimate. Others say they will surpass their predictions if there is a peaceful steel settlement. Many worry that there will be a bigger steel price hike this year than last. Some have already started building inventories in anticipation of a strike-induced shortage and a price increase. Others say they will do no hedge buying;



	Produce for Defense	Volume Increase Expected	Produce for Export	Volume Increase Expected
Analysis by Size of Plant:				
Plants employing 20-99	30.3%	4.4%	39.5%	1.8%
Plants employing 100-499	31.8%	2.3%	50.6%	2.0%
Plants employing 500 or more	52.1%	5.8%	62.4%	2.1%
By Major Industry Groups:				
S.I.C. 33—Primary metals	33.5%	1.9%	22.7%	1.1%
S.I.C. 34—Fabricated metal products	26.8%	2.4%	35.2%	1.7%
S.I.C. 35—Machinery (except electrical)	34.8%	5.0%	57.1%	3.3%
S.I.C. 36—Electrical machinery	44.2%	4.6%	57.3%	0.3%
S.I.C. 37—Transportation	46.2%	7.0%	41.5%	0.2%
S.I.C. 38—Instruments, related products	57.1%	3.3%	67.2%	2.5%
Other metalworking groups*	15.5%	1.8%	50.8%	0.6%

*S.I.C. 19, 25, and 39.

they fear a recurrence of the inventory imbalance that was so widespread during the recession.

• **Goal: Higher Productivity**—Many of the managers say one of their prime tasks this year will be finding ways to improve productivity. They won't depend on higher volume to lower unit costs of labor and overhead. One producer of hydraulic products has established a goal of "25 per cent more efficiency in 1959 operations."

The managers say here are some of the methods they'll use to get higher productivity: 1. "Automation"—Michigan stamping plant. 2. "Tighter controls throughout the plant"—New England steel fabricator. 3. "Standardization of materials and supplies"—producer of trucktrailers. 4. "Methods improvements"—gray iron foundry. 5. "Better tooling and more efficient equipment"—California metalworker. 6. "Products designed for simpler production"—appliance maker. 7. "A better incentive system"—New York foundry.

• **Wrapup**—The hefty gains in production and the wide array of problems pointed out in this year's survey signal a busy 12 months for the nation's metalworking managers.

• *Extra copies of this survey are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

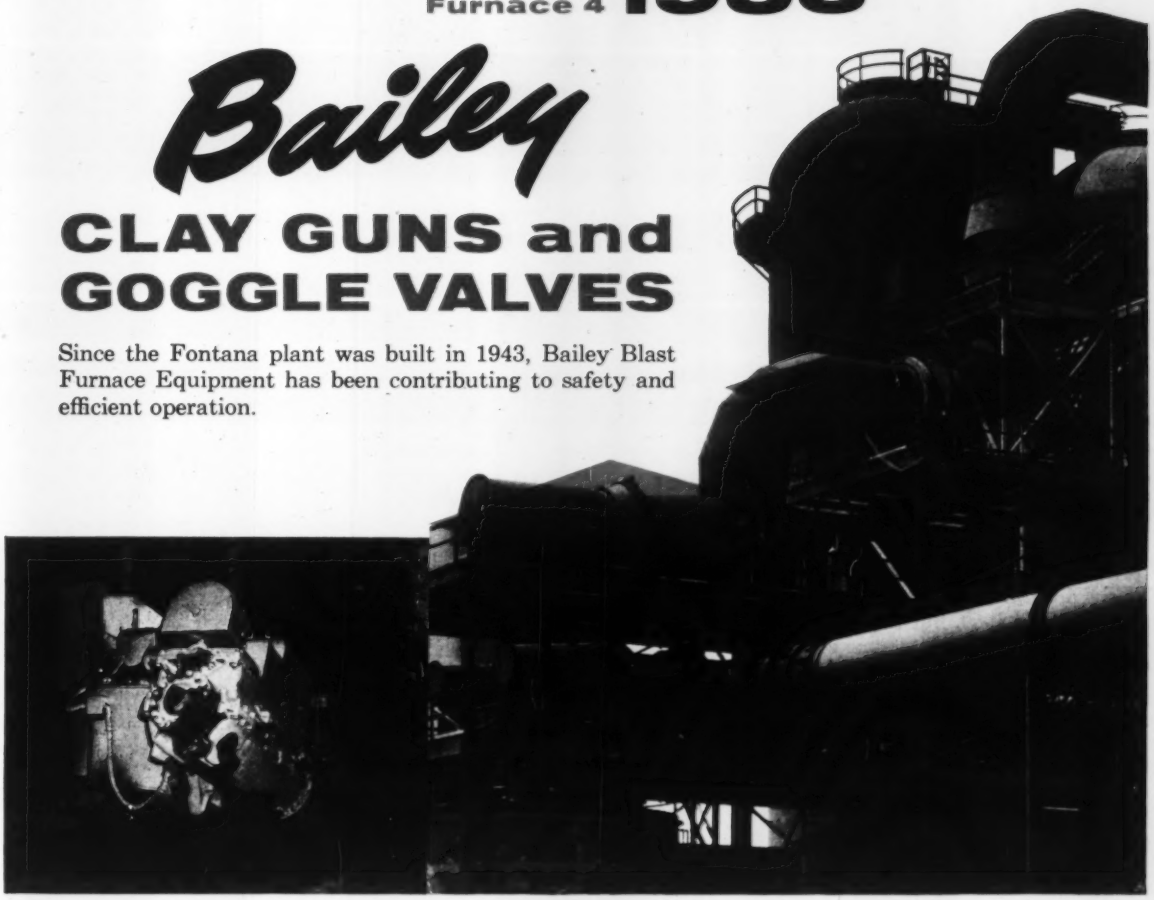
Used at KAISER STEEL since 1943

Furnace 1 **1943**
Furnace 2 **1949**
Furnace 3 **1952**
Furnace 4 **1958**

Bailey

CLAY GUNS and GOGGLE VALVES

Since the Fontana plant was built in 1943, Bailey Blast Furnace Equipment has been contributing to safety and efficient operation.



Bailey Clay Guns provide accurate positioning with high pressure for maintaining long tapping holes.

Bailey Thermal Expansion and Mechanical Goggle Valves protect men and equipment by controlling large gas mains. They are shown here in the half-open position while the newest blast furnace was under construction.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA

'59: Countdown Year for the Dems Aiming at '60 Election

THE DEMOCRATS are preparing to blast off in 1960. But the success of their political rocket at time zero will depend upon a series of legislative events in 1959. The countdown:

• **TEN — Social 'Progress'** — The party counts on the voters buying a policy of a "better" America. Included is an extended, and more expensive, social security program, which may not reach fruition until the summer of 1960 but which will be widely heralded by liberals this coming year. Party strategy is to avoid a vote until next year when even conservatives will find it politically difficult to oppose social security.

The construction industry will have a huge stake in Democratic plans for highways, housing, airports, and schools.

Highways—Industry groups like the Automobile Manufacturers Association, highway officials, farmers, even consumer groups like the American Automobile Association, are forming a solid front against increased gasoline taxes, which would put the Highway Trust Fund back in the black. (It has been operating at a deficit for several months.) Under the Byrd pay-as-you-go amendment to the highway act, federal road programs must be financed from the trust fund, rather than general Treasury money.

The outlook is for repeal of the Byrd amendment under the leadership of highway enthusiast Sen. Albert Gore (D., Tenn.). Until the Bureau of Public Roads presents Congress with a new analysis of highway financing problems (due in 1961), look for such stopgap measures as bond issues to keep the trust fund from dropping clear out of sight. A move to finance roads directly from general revenues will have strong appeal to many liberal Democrats, but economy may triumph for a while. For industry, the point is simple: Continuation of the Byrd amendment will stop the road program flat, at a time when it is about to live up to its original promise.

Housing — With economists already predicting a slackening of new housing in the last half of 1959, early efforts to push through an expanded Federal Housing Administration program can be expected. Rep. Albert Rains (D., Ala.), chairman, Housing Subcommittee of the House Banking & Currency Committee, will ask for another $4 billion to finance homes. He will be backed in the other house by Sen. John Sparkman (D., Ala.), Housing Subcommittee chairman. Both will also push to get the Budget Bureau to unfreeze $1 billion in funds held back this year.

Many Democrats will vote to lower the interest rates on GI houses. But the banking fraternity will probably be successful in forestalling the move.

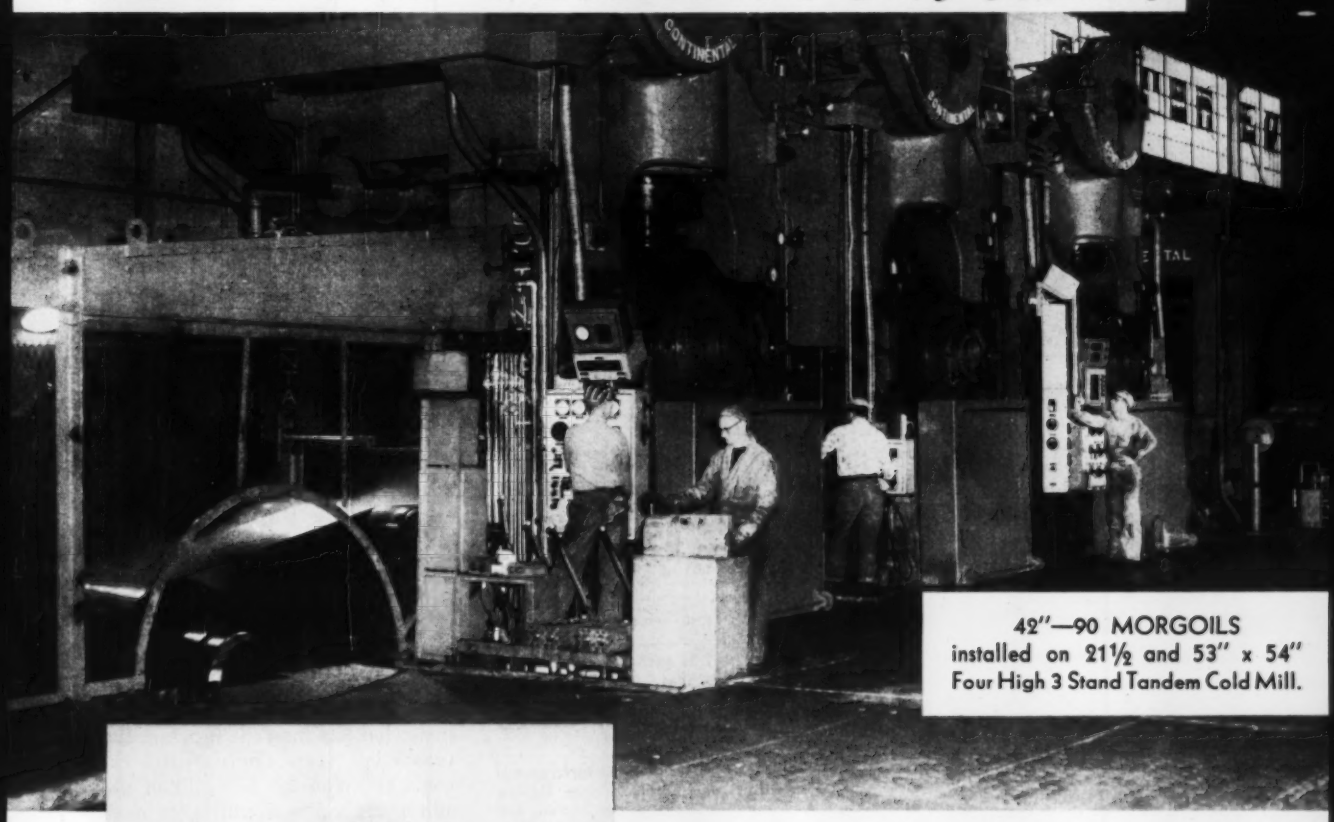
The U. S. Chamber of Commerce will run into a real fight as it attempts to kill off urban renewal, due for re-evaluation next session.

Airports—Sen. Mike Monroney's (D., Okla.) jet age airport program ($100 million a year) will pass without a hitch. He is also expected to take an interest in the airline industry's jet financing problems.

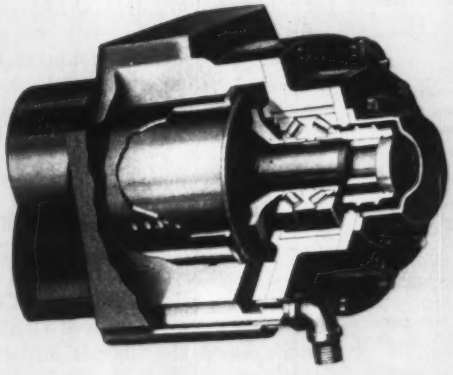
Schools—Barring the heavy hand of economy minded southern Democrats like Sen. Harry Byrd (Va.), a school program stands the best chance of passage it has ever had. Sen. James Murray (D., Mont.) will start the ball rolling in his Education Subcommittee.

• **NINE—Special Interests**—With Republican aid, some Democrats will try to broaden programs designed to help such special interests as small business and the mining industry (which also have plenty of vote appeal). Look for Rep. Wright Patman (D., Tex.) to tangle with the Small Business Administration over its new investment program. The congressman will charge the Small Business Investment Act is run by and for the "Wall Street bankers." He will also carry this fight over to his annual attacks

MORGOIL BEARINGS *in Action*



42"—90 MORGOILS
installed on 21½ and 53" x 54"
Four High 3 Stand Tandem Cold Mill.



MORGOILS offer you Low Maintenance—Long Life

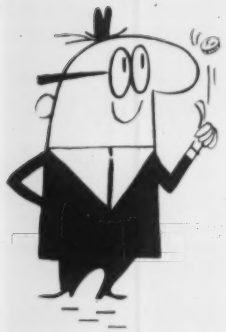
It is a proven fact that high quality MORGOIL BEARINGS provide top performance and long life. The proof lies in the fact that the large majority of the 180 world-wide operating companies utilizing MORGOIL BEARINGS, employ them on the back-up rolls of one or more of their mill installations.

MORGAN WORCESTER

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS

ROLLING MILLS • MORGOIL BEARINGS • GAS PRODUCERS
WIRE MILLS • EJECTORS • REGENERATIVE FURNACE CONTROLS

MB-33



What to Expect From Congress This Year . . .

	GOOD CHANCE	POOR CHANCE	COMMENTS
Airport building	x		Another Presidential veto of increased spending will be overridden.
Antitrust law "strengtheners"		x	Noise will come from Senator Kefauver but no definite proposals.
Atomic energy program expansion	x		AEC will get more R&D money; civil reactor program should be speeded up.
Auto dealer territory "security"		x	The trend seems to be just the opposite: Such a law might be unconstitutional.
Barter speedup		x	Congress will go no further than it did last session, unless State Department changes its tune.
Controls (standby) of prices and wages		x	Increased sentiment for these measures won't prove strong enough.
Corporate tax reduction.		x	Some of those who most favored it won't be around this year.
Debt ceiling increase	x		Absolute necessity with fiscal 1959's huge deficit.
Defense budget boost over Ike's recommendation of January, '59	x		By summer (when Congress turns to appropriations) even the Budget Bureau will O.K. another $1 billion, unless the Russians switch from missiles to Mixmasters.
Defense department streamlining		x	That battle was lost in 1958.
Depletion allowance reduction	x		Senator Proxmire had 31 votes in the Senate on his side last session.
Depreciation reform		x	Industry has yet to forcibly present its case to Capitol Hill.
Depressed area help	x		Unemployment will stay higher than normal this year.
Employment Act changes		x	Business and labor don't seem able to compromise their views on what amounts to wage controls, on one hand, and true "full" employment, on the other.
Fair Trade Law rebirth		x	The pros will get little encouragement from freshmen congressmen.
Federal Reserve System control by Congress		x	Representative Patman will try, and try, and try again, and again.
Foreign aid spending decline	x		Ike will ask for more than he got last year, and he will get less.
Foreign investment aids	x		A Space Age Congress appreciates the international point of view (when it doesn't cost too much).

(*Please turn to Page* 114)

on the Federal Reserve System. The tightening of money will be evidence for him that small business is having a rough time. He may reap some success in a brawl over interest rates the SBA is charging new investment firms.

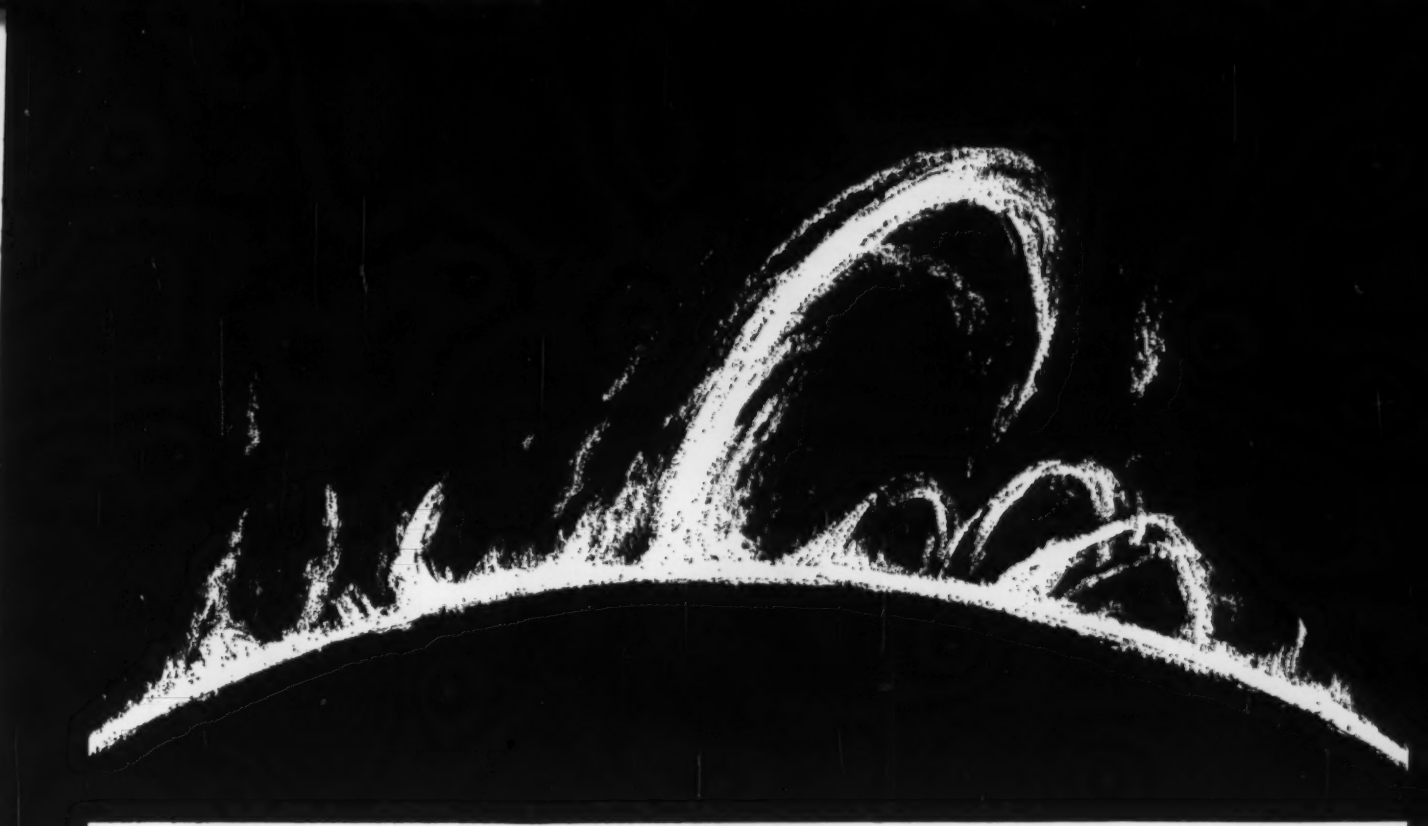
The mining interests will feel less secure in the new Congress than the last. Metropolitan representatives from the Democrat side of the aisle did a lot to kill the Seaton plan; western Democrats appear stronger and may offset some of the urban Democrats' gains. The South holds the balance. A southern-western alliance would be workable this year if the South needs votes in its civil rights fuss, but this would involve Senator Byrd. He is not likely to vote for subsidies.

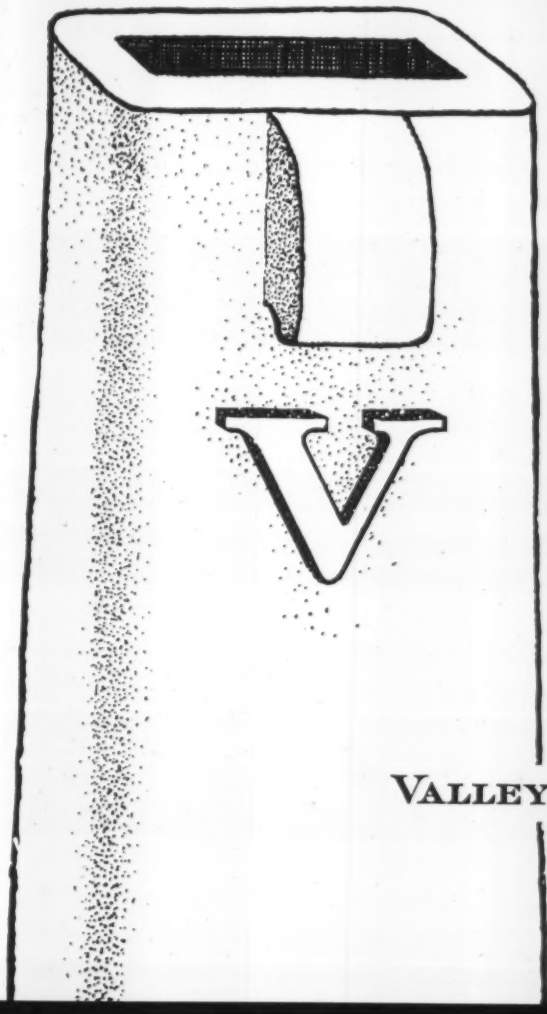
Dark horse for the miners is a plan to stabilize production at a stated percentage of domestic markets—Sen. Gordon Allott (R., Colo.) started talking it up in the last session.

• **EIGHT — Depressed Areas —** An essentially Democratic program will get help next session from the liberal Republicans. Sen.-elect Hugh Scott (R., Pa.) has served notice he will introduce legislation costing somewhat less than the program Ike vetoed last year. The cost still exceeds the plan for $75 million the administration was willing to push at the recession's depths. Depressed area legislation is a certain vote getter for the Democrats; liberal Republicans from industrial states where unemployment still runs above normal will be bound to follow Senator Scott.

• **SEVEN—Taft-Hartley—**Here lies the major test of union control of the Democratic party. Since November, conservatives have said industry faces a labor controlled Congress; they will be proved right or wrong when the liberals introduce a bill to kill Taft-Hartley's allowance for the open shop. The issue will not necessarily be one that the Democratic leadership is willing to tack high on its banner. Observers look for southerners to rally Republican and western Democratic strength to keep the open shop. But few expect T-H to be modified in favor of business: Secondary boycotts, for example, will still be with us after Congress goes home.

It does not appear that Demo-





Tomorrow

we'll harness the energy of the sun . . . . .

but even then

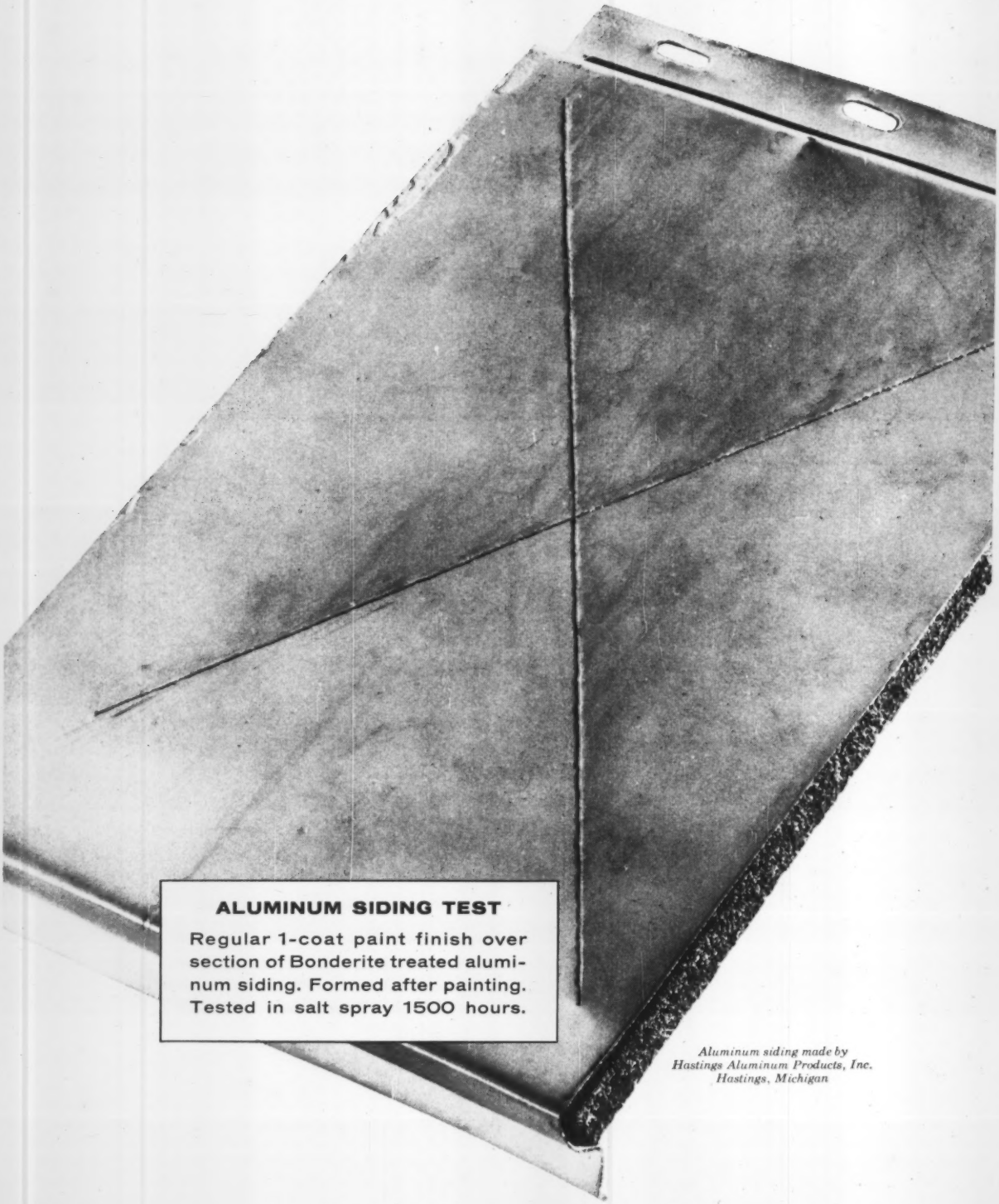
steel will be poured into

VALLEY INGOT MOULDS

VALLEY MOULD AND IRON CORPORATION

GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio

BONDERITE



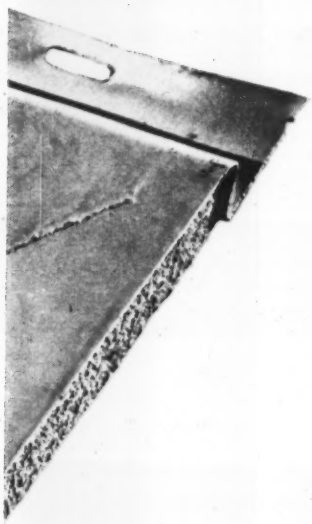
ALUMINUM SIDING TEST

Regular 1-coat paint finish over section of Bonderite treated aluminum siding. Formed after painting. Tested in salt spray 1500 hours.

Aluminum siding made by Hastings Aluminum Products, Inc. Hastings, Michigan

for ALUMINUM

Better paint adhesion...better corrosion control



In two hundred plants—many of them the leaders in their particular fields of aluminum fabrication—Bonderite for aluminum is being used today!

Bonderite makes it possible to take aluminum in the coil, run it through a continuous line in which the strip is cleaned, Bonderized, roll-coat painted, dried—and then recoiled.

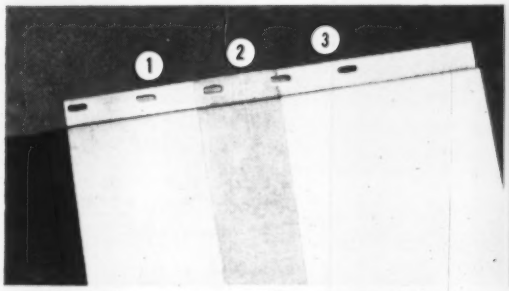
Because Bonderite gives paint such a secure foothold, it will stand severe forming operations (see photo below). With the Bonderite corrosion barrier at work, durability of the paint finish is almost indefinitely prolonged.

Bonderite meets and exceeds the requirements of Government Specification MIL-C-5541. Bare corrosion resistance is outstanding.

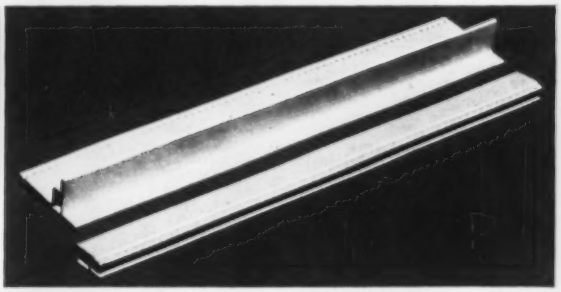
There's more than one type of Bonderite for aluminum. Besides the paint base, there's a Bonderite that creates a pleasant green coating, for use on architectural products. There's a Bonderite which protects without changing the characteristic color of the aluminum. Another Bonderite coats aluminum, steel and zinc—just the thing for mixed production.

There is a Bonderite, in fact, for every form of aluminum production, and for practically every alloy.

The big news in surface treatment for aluminum today is Bonderite! Let a Parker man tell you all about it!



Here's the 1-2-3 for durability of painted aluminum. Section of siding shows bare aluminum, (1); Bonderite treated, (2); and roll-coated paint, (3).



These aluminum window and screen frame sections were Bonderized and painted in the strip and formed after painting. There isn't a break in the finish anywhere!

Since 1914—leader in the field

PARKER RUST PROOF COMPANY

2158 E. Milwaukee, Detroit 11, Michigan

Tel: TRinity 5-3377

BONDERITE corrosion resistant paint base	BONDERITE and BONDERLUBE aids in cold forming of metals	PARCO COMPOUND rust resistant	PARCO LUBRITE wear resistant for friction surfaces	TROPICAL heavy duty maintenance paints since 1883

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

(Concluded from Page 114)

cratic hopes for 1960 depend too much on their treatment of T-H. Right-to-work strength in Kansas was enough to show the party that the union side is not always the side where its bread is buttered.

• **SIX — Foreign Relations** — Both parties agree our economic relations with the rest of the world need re-evaluation. Republicans generally favor outright tax reductions on foreign investments; Democrats seek a tax deferral approach so their legislation doesn't smack of too much help to big U. S. firms.

The cold war with Russia will have a lot of importance here. If the Communists let matters quiet down, both parties would be inclined to accept a compromise. But if Russian competition for U. S. markets grows, which appears likely, the issue will have prime political importance.

A byproduct will be the Mutual Security Act appropriation bill. Economy here is easy yet dangerous in terms of national security. Substitution of investments for loans appears to be a fair compromise, if all interests can be satisfied.

• **FIVE—Antitrust**—Hopes of the liberals run high for tougher antitrust laws. A few are talking of a new trust-busting era. The first test will come on the reaction to the prenotification of mergers bill which has been around Congress for several years. A strong vote for it will encourage the likes of Sen. Estes Kefauver (D., Tenn.) to greater efforts.

• **FOUR — 'New Era' Legislation** —The water shortage, air pollution, and atomic energy are examples of problems the Democrats feel must be solved before they return to the voters in 1960. If they can bull through comprehensive plans to have economic electricity from nuclear energy by the 1970s, to get fresh water from salt water, and to guarantee us all clean air, they think they have as good a group of vote getting issues as any party could hope for.

• **THREE—Space**—Trips to Mars for your grandchildren seem to be a part of the big plan. Sen. Lyndon Johnson (D., Tex.), the party's most vocal leader in space matters, will be

	GOOD CHANCE	POOR CHANCE	COMMENTS
Highway legislation: Increased gasoline taxes		x	The states like to keep gasoline taxes for their own revenue needs as much as possible.
Byrd amendment suspension	x		Otherwise the federal program will collapse.
Housing legislation: More mortgage funds	x		Look for FHA to be boosted and broadened in concept.
Lower interest rates		x	After all the shouting, "No."
Import controls		x	State Department will continue to call the major trends.
Inflation controls		x	The boom will not return fast enough to scare Congress.
Kennedy-Ives labor bill	x		It is the easiest for most to live with.
Labor-management relations	x		A national level committee representing both sides will be recommended by Congress to meet periodically.
Latin American aid	x		Tax benefits will be offered; new import encouragements are likely.
Manufacturers' sales tax		x	An over-all tax makes it too difficult for Congress to grant special favors to special interests.
Merger prenotification	x		It looked like a cinch last year.
Mineral program		x	The Seaton plan isn't mobile enough for the Westerners. They prefer to go at the problem piecemeal.
Minimum wage increase	x		To $1.25 an hour, but broader coverage is less likely.
Personal tax cuts		x	A sincere effort to lower the higher bracket rates will founder.
Postal rate increases	x		Where else can they go but up?
Public works program boosts	x		Across the board. This is the one area certain to exhibit the "liberal" tendencies of the new Congress.
Railroad loans		x	They didn't like what they got last session.
Renegotiation reform		x	Industry needs to present a solid front.
Research spending boosts	x		National Science Foundation should do well.
Right-to-work changes		x	Labor seeks amendment of Taft-Hartley to ban the open shop, but the Senate will kill the effort.
Russian trade encouragement		x	Moscow won't let up the cold war.
School construction	x		But housing, highways, and defense have priority.
Science cabinet post	x		The argument: Too many of our "futuristic" programs are run by nonscience departments. Example: Weather control is run by Commerce Department.
Shipping help	x		Higher subsidies must be passed to meet increased foreign competition.
Small business loans		x	Enthusiasts will try to prove last year's aid wasn't good enough.
Social security expansion		x	Plenty of talk this year in preparation for a big push in the election year of 1960.
Space agency budget boost	x		Ike will ask for $500 million; Congress will give him $1 billion.
Union power controls		x	This isn't the right Congress.
Water resource development	x		Saline conversion, yes; public dams are less likely.

"Down time's" double, and he's in trouble!

Alas, poor foreman! The plant manager is really blowing up. And so soon, too!

For the idle man-hours he's beefing about were chalked up only yesterday. Yet the whole story was on his desk today—thanks to the speed of Automatic Keysort punched-card controls.

Time was when below-standard performance went undetected for weeks, while overhead leaped upward like a gazelle. Slowly-processed figures were to blame. But now Keysort gives the plant manager a detailed summary of the previous day's labor costs by 2 P.M. each afternoon. Knowing the facts, he can move to correct wasteful in-plant situations *on time* —before they turn into profit drops.

Automatic Keysort is today's only data processing system that provides a family of integrated machines and methods designed for automatic creation and processing of original records. Speeding vital day-to-day and long-range facts essential to sound management, this unique system fits easily into your present operations . . . is highly flexible to future growth and expansion.

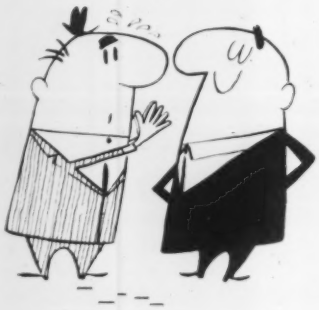
With the Automatic Keysort System, manufacturing concerns of every size can now enjoy fast, accurate data processing on either a centralized or decentralized basis. Without restrictive, complex procedures. Without specialized personnel. And at remarkably low cost.

Call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, N. Y. for illustrated brochure F-2.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

Business and the 86th Congress:



SIX MAJOR ISSUES

CORPORATE TAXES

If basic reform (like progressive decreases in corporate taxes proposed in the Sadlak-Herlong Bill) is what most businessmen want, Congress has yet to learn it. Emphasis of leading business groups on economy in government makes such tax reductions seem illogical to many congressmen in view of the deficit of fiscal 1959, and the possibility of another deficit in fiscal 1960. Economy probably could be achieved in many relatively small areas, say many congressmen, but great savings in the major areas like defense, farm programs, mutual security, veterans' benefits, and interest on the national debt appear unrealistic to them.

DEPRECIATION

Most of those on Capitol Hill familiar with industry's need to re-equip know the U. S. doesn't have the best system of depreciation. Yet, when Internal Revenue Service asked for advice, response from industry was negligible. Only the big associations of businessmen consulted IRS, whereas a wealth of individual response had been hoped for. It is difficult, and sometimes politically dangerous, for your representative to line himself up with the so-called pressure groups of business.

HIGHWAY & HOUSING

More money from Uncle Sam is going to be needed to keep these programs rolling at top speed. Does industry want that or would it prefer to see a slowdown as an anti-inflationary effort?

LABOR-MANAGEMENT RELATIONS

The hue and cry about bad practices was not confined to the unions alone, as the McClellan Committee showed. Industry must draw up its own code of ethics for dealing with its employees, say many congressmen.

RENEGOTIATION

Some business groups want it killed; some want it modified, and they can't agree how. It is not a problem for the bulk of STEEL's readers today, because the $1 million floor protects many firms. If a workable and livable law doesn't come out of the new Congress, however, the stage will be set for more problems later as more firms become eligible for renegotiation.

RUSSIAN TRADE

The scrap industry is still living with the fact that it sold scrap to the Japanese just before Pearl Harbor. Yet, Russia is a fabulous market for U. S. products and knowhow. The new Congress may well set Policy for trade with the Communists for years to come. Have you let your congressmen know how you feel about this issue?

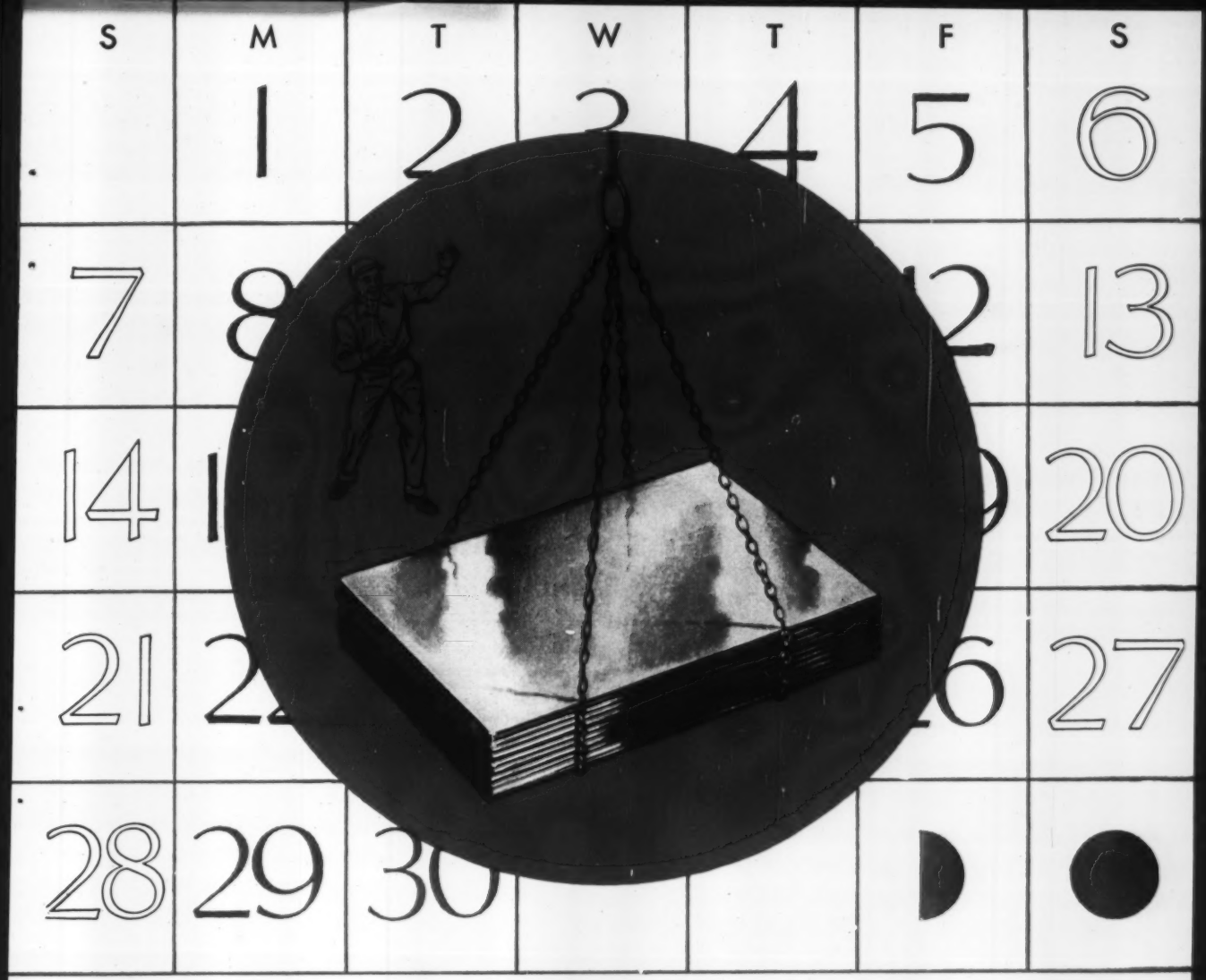
in on more investigations of the speed and efficiency of our National Aeronautics & Space Administration. The agency is likely to get more money than it asks for.

• **TWO — Defense** — Leaders like Sen. Stuart Symington (D., Mo.), who maintains big hopes for the Presidential nomination, and Sen. Henry Jackson (D., Wash.) will give us more statements on national defense, guaranteed to make us fighting mad or scared to death. They'll scoff at Ike's budget request for slightly more spending than fiscal 1959. The Democrats will push the defense budget up as far as they dare. They're not willing to wait for Russian successes to tag them as the party that wouldn't spend to insure U. S. supremacy.

• **ONE — Inflation** — The biggest issue of all to the voter: How much is he getting for his dollar in the supermarket, the department store, and at his friendly auto dealer. Last month, economists started to wrangle with the problem of rewriting the Full Employment Act before the Joint Economic Committee. They disagreed violently: Business groups generally want the act to include a reference to stabilized prices; unions claim such wordage would submarine the act's intention to create an economy in which everyone is employed. Neither party, of course, wants a depression to keep prices down, and neither wants full employment to become synonymous with roaring inflation.

The state of the economy appears to be in the Republicans' favor. No one expects inflation to more than creep this year. If it speeds up rapidly next year, the Democrats have a readymade issue.

The economy forces in Congress, led by Sen. Harry Byrd (D., Va.), will back Ike's balanced fiscal '60 budget. From fiscal '54 through '59, U. S. spending jumped from $67.8 billion to $81.7 billion. The increase has been in domestic, not foreign, spending. Foreign spending, including the budgets for defense, Atomic Energy Commission, and the Mutual Security Act, declined by $300 million in the period. Domestic spending climbed almost $14 billion. Biggest rises: Veteran aid, farm aid, labor-welfare programs, general government costs, dept interest, housing, roads.



Ingersoll Steel Deliveries

TIMED TO YOUR PRODUCTION

Here at Ingersoll Steel we knock ourselves out to give you on-time, as-promised delivery of a wide variety of special purpose steel sheets and plates. The minute your order is received it starts getting the V.I.P. treatment—and that's the way it goes all the way to your receiving department.

Being a specialty mill, we can and do adjust our production schedules to dovetail with your production needs. And with our advantageous central location at New Castle, Indiana, prompt deliveries are assured. Next time you need any of the products listed below, call Ingersoll Steel and you'll see what we mean.

Ingersoll Produces:

STAINLESS STEELS • HEAT RESISTING STEELS • INGACLAD STAINLESS-CLAD SHEETS • ALLOY STEELS • FORGING QUALITY ELECTRIC STEEL INGOTS • AUTOMOTIVE CLUTCH PLATE STEELS TEM-CROSS CROSS-ROLLED STEEL • CARBON ELECTRIC STEEL FOR TRACTOR CLUTCH DISCS • KNIFE STEELS • SAW STEELS HIGH SPEED HACK SAW STEELS • SOFT CENTER AND OTHER AGRICULTURAL STEELS • SPECIAL ANALYSIS STEELS

B-W ®

Ingersoll STEEL DIVISION

Borg-Warner Corporation

New Castle, Indiana

HYATT ROLLERS ARE MATCHED WITHIN 50 MILLIONTHS OF AN INCH SO THEY WILL RUN LIKE A FINE JEWELED WATCH!

Automatic electronic controls and precision testing equipment—under the watchful eyes of conscientious craftsmen—give HYATT Hy-Rolls a standard of quality never before achieved in quantity production.
For maximum performance per bearing dollar, insist on . . .

HYATT *HY-ROLL BEARINGS*
FOR MODERN INDUSTRY

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

NO BEARINGS carry radial loads like cylindrical bearings . . .
and NOBODY knows them like HYATT

U.S. Auto Production

(Units)

	1959†	1958*	1957	1956
GM	2,713,000	2,153,000	2,816,000	3,062,000
FMC	1,675,000	1,208,000	1,890,000	1,669,000
Chrysler	790,000	624,000	1,222,000	870,000
AMC	312,000	210,000	114,000	104,000
S-P	83,000	55,000	73,000	96,000
Totals	5,573,000	4,250,000	6,115,000	5,801,000

†Projected. *Preliminary. Adapted from *Ward's Automotive Reports*.

1959: Autodom's Make-Ready Year

AUTODOM'S preoccupation with cost reduction underlies many of the developments which will capture the headlines in 1959—the small car, the aluminum engine, standardized parts, greater use of aluminum, plastic tooling, cold forming, and decentralization.

• **Small Cars Coming** — Detroit knows that GM's Fisher Body Div. has released some tooling orders for an economy car body. Some of the cars will be built at Chevrolet's Willow Run, Mich., facilities. Two models are planned, both on a 106 in. wheelbase. One will be marketed through Chevrolet dealers; the other will be handled by other divisions.

Sources at the corporate level say the car could be introduced as early as June if GM's sales lag, but if the market holds at the 5.5 million level or above, it's more likely that General Motors will wait until the regular introductory season.

• **Competition**—Ford Motor Co. is close behind GM. It also has two models; one is a station wagon. Its engine line at Lima, Ohio, is already turning out the revamped Ford industrial engine which will have performance characteristics similar to the Ford Taunus powerplant (See STEEL, Dec. 15, 1958, p. 99).

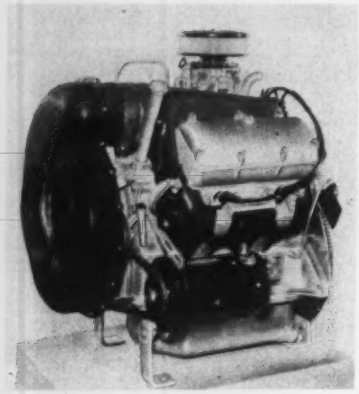
Chrysler's plans aren't as far along, although design studies of its car are being completed. It could be ready for production by late 1959. Union sources report Chrysler told them the car will be built in the Dodge Main plant, Hamtramck, Mich. Chrysler asserts it is only studying the possibility.

• **Market Looks Up** — GM's decision to go ahead with a smaller car indicates the industry believes the demand for economy will hold up through 1965.

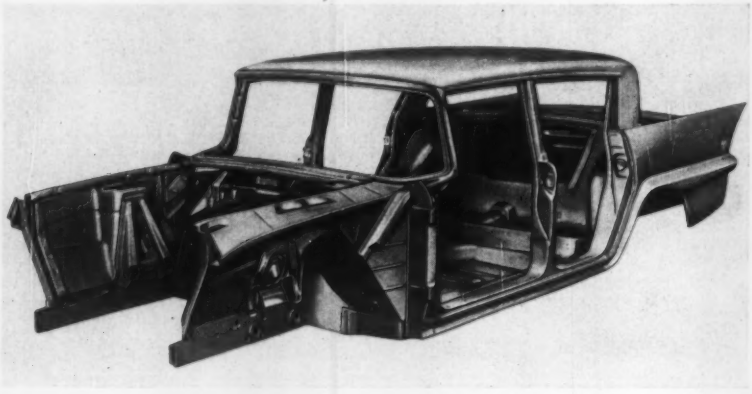
The industry expects to see at least 900,000 economy cars sold in the U. S. this year. Some 400,000 will be imports. This leaves half a million economy jobs to be marketed mainly by American Motors Corp. and Studebaker-Packard Corp. George Romney, AMC president, predicts sales over 300,000 units for his company. S-P's projections call for 83,000 Larks.

• **Aluminum Engine Bows**—With the smaller cars come aluminum engines. Foundrymen view this breakthrough with alarm, but automotive designers are enthusiastic because the light engines require less machining time and make for better weight distribution.

GM's powerplant will be of the



This AMC, 4 cylinder, air cooled, aluminum engine is a forerunner of the powerplant for 1960's small cars



The unitized body is now only on the Rambler (above), Lincoln, and Ford Thunderbird. But Chrysler Corp. will unitize all but the Imperial, and General Motors is considering at least partial unitization

Porsche design with gray iron finned cylinders sandwiched between a permanent molded aluminum head and crankcase.

The other aluminum engine will be a fairly conventional, 6 cylinder diecast design for Chrysler. It apparently will be of wet sleeve construction with iron particles impregnated into the aluminum by means of a unique diecasting technique. Details are sketchy, but talk has it that polished stainless core pins will be sprayed with iron. After the shot, cold water is injected through the pins, causing them to shrink slightly. As they're withdrawn, the rougher particles of iron adhere to the liner walls. Lining thickness will be about 0.020 in.

• **Big Cars** — Detroit's standard products will also get the economy treatment. Design integration will be aimed at: 1. Redesigning components so several parts can be made as a single unit. 2. More standardization so more parts can be used interchangeably.

One way to realize more integration is to use unitized construction. GM and Ford small cars will have it. Chrysler reportedly was going to unitize only Plymouth bodies, but now it's known that all Chrysler lines except Imperial will get this body building treatment. It won't be the AMC version. Front fenders and firewall assemblies will be welded together and reinforced with framing members. The same will be done on rear quarters. Front and rear ends then will be hung on a shortened semiladder type frame.

After much cost probing, the Lincoln people decided to continue with unitized construction through 1960. Beyond that, it still appears that this car will switch to a common body and frame that can be shared with Mercury. While GM has not made up its mind, the corporation is firmly convinced that standardization will pay off better with unitized body components. Like Chrysler, GM appears most intested in the partial unitization approach.

• **Standardization** — In another move to reduce costs, GM will continue the standardization trend it started in 1958. Chrysler has already made many of its parts interchangeable. Ford will follow suit this year. The next big items on the list are brakes, driveshafts, and axles.

GM's Fisher Body Div. has explained that standardization makes for annual styling changes. Chevrolet already has released orders to revamp dies for its third styling change in as many years.

• **Drive Lines**—Rear transmissions will be the breakthrough in this area. GM's Trans-axle has been shelved for 1960, but there's a possibility Lincoln may offer its version on the '60 models. Other transmission advances will follow the pattern laid down by Ford. GM is improving Dynaflow and redesigning the Hydra-Matic into a slim line model. Detroit Transmission Div. is working on an inexpensive two stage Hydra-Matic to compete with Ford's low cost job. It probably will appear first in GM's economy cars.

• **Brakes**—Designers still haven't made much progress toward a practical brake that's inexpensive enough to warrant production release. Most promising developments seem to be a semidisc type similar to the Girling unit. Liquid cooled jobs still are being studied by Lincoln.

The brake problem will be lessened this year by the use of diecast integral wheel and drum combinations made of aluminum. Chrysler reportedly will have them on some 1960 models. Two GM divisions are expected to make the move. Ford's plans are uncertain.

Auto Plant and Equipment Spending

1959†	$600,000,000
1958*	577,000,000
1957	1,058,000,000
1956	1,689,000,000
1955	1,128,000,000
1954	1,295,000,000

†Projected.
*Preliminary.
U. S. Department of Commerce.
Automobile Manufacturers Assn.

Forming Methods Cut Costs

Motordom's next big manufacturing objective is to sharpen methods. It wants to convert raw materials

CASE HISTORIES

Exclusive Sentri-Seals effectively seal out foreign materials at temps up to 225° F for extended periods — up to 350° F for shorter periods. Made of Buna-N, they are compatible with silicone, petroleum and diester lubricants.

Photo courtesy: Thor Power Tool Company

Bearings Seal Out Abrasives... Allow Cool Operation In 21,600 R.P.M. Grinder!

CUSTOMER PROBLEM:
Tool manufacturer requires bearing design that will seal 21,600 r.p.m. grinder from abrasives . . . yet heat must be minimized for operator comfort since tool is hand held.

SOLUTION:
N/D Sales Engineer recommended a group of four New Departure integrally enclosed bearings . . . some with Sentri-Seals. These precision ball bearings successfully shut out microscopic grinding abrasives. And, even with such positive sealing, the virtually friction-free New Departures help keep the temperature low enough for comfortable hand operation. They're sealed and lubricated for life . . . promising trouble-free ball bearing performance without the added burden of periodic maintenance.

For immediate analysis of your current ball bearing problems, call the New Departure Sales Engineer in your area or write Dept. T-1.

Available through United Motors System and its Independent Bearing Distributors.

NEW DEPARTURE

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL

WELDMENTS
ACME WELDING
DIVISION OF THE UNITED TOOL & DIE CO., WEST HARTFORD 10, CONN.
Machine bases, components, environmental and test equipment, pressure vessels . . . welded fabrications of every kind. Extensive cutting, forming, welding, X-ray and gamma ray equipment. Qualified welders. All recognized codes. Send your drawings and specifications to us for prompt detailed quotations.

Optional Equipment Installations

(Percentage of model year output)

	V-8 Engines	Automatic Transmissions	Power Steering	Power Brakes	Power Seats
1959*	77.1	78.5	41.3	29.7	7.7
1958	76.2	77.5	40.7	29.2	7.3
1957	82.5	79.1	35.6	27.8	6.7
1956	80.9	75.1	27.2	24.3	6.6

*Projected. Adapted from published R. L. Polk Co. data.

into finished parts with the fewest possible operations. The industry is convinced cold forming techniques offer the greatest potential, although cheaper forging and casting methods won't be neglected. Here are five examples of trends in materials and manufacturing methods that will grow this year:

• **Cold Forming** — GM's Saginaw Steering Gear Div. used automatic screw machines to make slugs from which its universal joint bearings are formed. This year it scrapped the multiple spindle jobs and is cold drawing coil steel and knocking the slugs off in a cold header.

Savings are 16.8 per cent per part.

• **Cast Steel Dies**—GM's Oldsmobile Div. is making cast steel dies for forged parts. Casting to 0.005 in. tolerances eliminates expensive die sinking operations. Die costs are cut almost 50 per cent, and production life is equal to that of wrought dies.

• **Cold Lubrication**—By using a cold, roll-on lubricant, Fisher Body, Ford, and Chrysler stamping plants can switch to lower cost commercial grade cold-rolled steel in place of drawing quality sheets for many stamped parts.

• **Aluminum**—Some 57 lb of aluminum are going into the average 1959 car. Aluminum producers indicate the average will be about 62 lb in 1960. About 40 per cent will be diecastings which provide close tolerances and usually require little buffing, polishing, or trimming. Elimination of the costly operations and lower handling charges (because of molten metal contracts) make aluminum a natural for continued use in the 1960s.

• **Plastic Tooling**—It's already successful for short run production dies and light jigs and fixtures. Next year, the industry will impregnate plastic with metal and cast it into dies to get longer production life. Metal impregnated plastic dies can be used to turn out parts for low volume lines like Dodge, De Soto, and Pontiac. Car designs no longer call for the deep draw stampings that require heavy steel dies. Plastic dies have enough strength to rap form today's flat body panels.

Investment Moves Slowly

Those advances in technology and methods call for little capital spending this year. Machine tool makers, for example, expect a gradual business upturn this year, but they see no major buying by automakers through 1962.

Car companies are now involved in retooling, rebuilding, and reassigning machine tools. But 1959 will see the start of two advances in this field that will have an impact on motordom's future plans: 1. More numerical controls will be used—even on vertical boring machines. 2. The industry expects to agree on standards for building block components, although no or-

Import Sales

	Units	% of Market
1959†	400,000	7.3
1958*	362,000	8.4
1957	259,000	4.4
1956	108,000	1.9
1955	57,000	0.8

†Projected. *Preliminary.
Automobile Manufacturers Assn.

Miniature imports, like this German Goggomobil, are good conversation pieces, but the main market is in longer wheelbase cars

ders are anticipated before 1960.

• **Planning**—The Department of Commerce says first quarter capital expenditures of the automotive industry will be $119 million, vs. $143 million in 1958's first quarter and $297 million in the first quarter of 1957. Almost all of that money will go into equipment; little will be used for bricks and mortar. It looks like the industry's capital investment will be about $600 million this year, slightly above 1958's preliminary total ($577 million).

When plant construction does start (some contracts will be let in the fourth quarter), it will be mainly for manufacturing rather than for assembly facilities. Assembly plants can produce at least 10 million cars a year, and automakers don't expect such production for some time. One forecast says 1963 will be the next peak year—a possible 7.4 million cars may be produced. In 1965, production may reach 8.5 million. The Ohio Valley and the Southwest will see a further concentration of automotive plants.

Marketing Trends

It seems unlikely that the automobile industry will drop its dealer structure, although there's talk of automotive supermarkets and factory merchandising. Dealers are strong enough to protest any such maneuvers. The companies don't want to see them go because they represent millions of dollars worth of marketing capital.

• **Here's The Trend**—Probably the biggest change coming up will be growth of open lot marketing. Dealer corporations will sell and display cars on several open air lots (like used car pitchmen), but they'll build central service depots to handle maintenance.

Each Firm Has Headaches

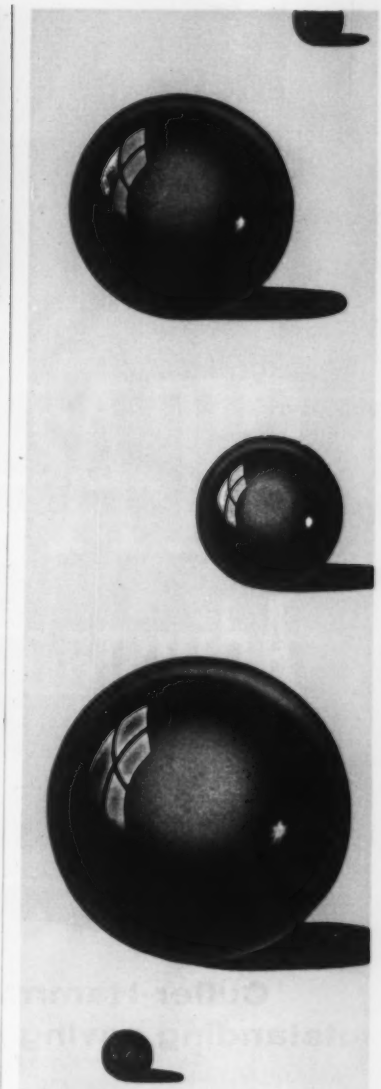
Autodom as a whole faces metalworking's big problem of rising labor and material costs. In addition, each company has its own peculiar corporate headache.

The biggest concern to GM in the next few years appears to be how well it can maintain divisional autonomy while it continues to push the use of interchangeable parts to cut down on manufacturing costs. Division chiefs understand the need for standardization, but they tend to resent it because it limits individual accomplishment. But management will go along with the plan. GM's aim is to keep divisions separated—but standardized—so it can avoid Congressional antitrust probes.

Ford Needs Management

After a year of management shakeups and ousters, Ford Motor Co. finds it still lacks middle management people who are capable of taking over top management reins. The building of a strong chain of command this year is important to the company's future.

Detroit is hearing rumors that Ernest R. Breech, chairman, will retire shortly. Talk persists that



COOLIDGE CORPORATION

MIDDLETOWN, OHIO

Now STATIC POWER

Adjustable Speed Packaged Drives

No moving parts . . .

Cutler-Hammer *ULTRAFLEX®* *DRIVES* provide outstanding savings in installation—operation—maintenance

No moving parts! Light, compact static power conversion units have replaced the conventional m-g set. Ultraflex Packaged Drives save up to 50% in valuable floor area . . . up to 75% in weight, permitting rapid, low cost installation or rearrangement of production machinery without special handling equipment or floor loading preparations.

No moving parts! Ultraflex Packaged Drives provide a new high standard of operational efficiency and ultra-responsive speed control. Works perfectly without forced ventilation . . . less power wasted as unwanted heat. No power robbing friction or windage losses.

No moving parts! Simple static power conversion units require only a fraction of the time and effort needed to maintain conventional rotating type drives. With Ultraflex, there are no bearings, commutators, or brushes to service. No shafts to align. No couplings to maintain. No inertia loads to balance. No fans or filter to clean or change.

Ultraflex Packaged Drives come complete with operator's station, static power conversion unit, and heavy duty D-c drive motor. Standard Ultraflex Drives provide an 8:1 speed range with wider ranges available upon request. Optional features include dynamic braking, jogging, reversing, tach-generator speed regulation, etc.

Cutler-Hammer also provides a complete engineering service which will custom-design a static powered adjustable speed drive to meet your specific requirements. Get all the facts today, write on your company letterhead for new bulletins EN64-A213 and EN65-A213 Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

CUTLER·HAMMER
CONTROL
C·H

Cutler-Hammer Inc., Milwaukee, Wis. • *Division:* **Airborne Instruments Laboratory.** • *Subsidiary:* **Cutler-Hammer International, C. A.**
Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.; Intercontinental Electronics Corporation.

ULTRAFLEX DRIVES Pack More Power per Square Foot... More Power per Pound

HP	CONVENTIONAL m-g DRIVES SQ. FT.	CONVENTIONAL m-g DRIVES LBS.	ULTRAFLEX—E SQ. FT.	ULTRAFLEX—E LBS.
5	3.89	543	Wall Mounted	215
7½	3.89	550	Wall Mounted	215
10	5.44	647	Wall Mounted	215
15	7.0	983	Wall Mounted	330
20	9.5	1830	Wall Mounted	330
25	9.5	1990	Wall Mounted	330
30	9.5	2120	6.46	625
40	13.8	2350	6.46	625

HP	CONVENTIONAL m-g DRIVES SQ. FT.	CONVENTIONAL m-g DRIVES LBS.	ULTRAFLEX—M SQ. FT.	ULTRAFLEX—M LBS.
5	3.89	543	3.5	660
7½	3.89	550	3.5	670
10	5.44	647	3.5	670
15	7.0	983	3.5	1000
20	9.5	1830	3.5	1000
25	9.5	1990	4.5	1250
30	9.5	2120	4.5	1250
40	13.8	2350	4.5	1250
50	17.8	2980	11.7	2200
60	23.3	4070	11.7	2200
75	23.3	4800	11.7	2200
100	25.2	5700	11.7	2400

ULTRAFLEX E 1 HP to 40 HP

Electronic Type Adjustable Speed Drives

Ultraflex E is the simplest, most flexible, most dependable electronic adjustable speed drive on the market today. Heavy duty power tubes have replaced all "radio type" components assuring maximum efficiency and maintenance-free operation. Standard features of design include a closed loop voltage feed back system for accurate voltage regulation, current limit control, and static rectifier field excitation. Compact design permits wall mounting of the control units up to 25 HP.

ULTRAFLEX M 1 HP to 200 HP

Magnetic Amplifier Type Adjustable Speed Drives

Ultraflex M Packaged Drives set new standards for ultra-efficient, ultra-responsive operation. Fully 15% more efficient than conventional rotating type drives, the static magnetic amplifier power conversion unit avoids all power losses due to friction, windage and the necessity of transferring power across multiple air gaps as in rotating machinery. Standard Ultraflex M drives are equipped with a closed loop voltage feed back system with IR compensation for accurate voltage regulation, current limit control, and static field excitation.

U. S. Truck Registrations

(Thousands of units)

	Light	Medium	Heavy	Totals
1959†	590,000	125,000	275,000	990,000
1958*	505,000	110,000	205,000	820,000
1957	577,000	141,000	231,000	949,000
1956	561,000	178,000	261,000	1,000,000

†Projected. *Preliminary.
Adapted from *Ward's Automotive Reports.*

The trend in heavy trucks is to diesels with tilt cabs, like this Diamond T with Spicer Presto-matic transmission

Henry Ford II will be named to Mr. Breech's post, and his position as president will be taken by William Clay Ford.

Ford naturally denies this rumor, but there's little doubt in motordom's mind that the company needs strengthening near top levels. This year Chevrolet will outsell Ford by a wide margin despite last quarter gains. Chevy sales through November, 1958, total 1.17 million, against Ford's 999,000 total.

Chrysler Has UAW Trouble

Labor continues to be Chrysler Corp.'s chief irritant. When the last vestiges of the old Briggs Body contract are gone, the company should be in a position to get its work standards on a par with those of the Big Two. Until then, the firm will continue to be plagued by wildcat walkouts.

The company cannot remain in Detroit and be competitive. The UAW now charges that antiquated plants and equipment are causing the higher production demands it's angry about. Its position seems to give Chrysler the opportunity to transfer major operations to Ohio and Indiana, but the union indicates it will fight transfers to protect Detroit jobholders. Chrysler management hints it will continue to decentralize. It believes this will put the UAW on weaker bargaining ground for future battles.

Look for Chrysler to build up its European manufacturing and marketing activities this year. It has never been competitive in the export or foreign market but now plans to take advantage of common market trading.

How's AMC's Health?

George Romney, American Motors Corp. president, is the man of the hour in Detroit. Rambler sales doubled this year. AMC reports a $26 million profit for fiscal 1958. The company is spending $10 million to upgrade manufacturing facilities and boost annual production capacity over 400,000 units. Mr. Romney expects better than 300,000 unit sales this year.

Industry pessimists still wonder how Rambler will do when it's stacked up against Ford and GM economy cars and marketing skills. Unless the firm has guts enough to make drastic changes that will be industry firsts, motordom suspects it still may be in for rough going.

So far, there are few signs that Mr. Romney will take the gamble. The company plans a facelift for 1960. It's looking at an aluminum block engine and a trans-axle, but initial reactions are chilly. AMC's challenge: Get gutsy again!

S-P Fixes Bayonets

Lark shows up well on dealer sales, but there aren't enough registration figures available to tell whether the South Bend automaker's gamble has paid off. Economy cars are the right idea, but the Lark may be a little too late to help Studebaker-Packard Corp. out of its financial hole.

Detroit believes that under the guidance of A. M. Sonnabend, the merger wizard, S-P's name will remain in the corporate directories, but the industry doubts that the firm will continue to produce cars. Rumors that International Harvester Co., Chicago, might take over Lark manufacturing and sales are discounted. S-P has talked about 160,000 sales this year. Unless a boomlet appears, it seems unlikely it can get more than 100,000. Break-even reportedly is around 120,000 units. The company built about 55,000 cars in 1958.

Suppliers Take Heed

Automakers see 1959 as a make-ready year. Integrated designs and standardized parts mean fewer suppliers will be getting contracts for parts, but those who do will find the orders are larger.

As a vender, you'll want to start thinking along these lines: 1. Look for patentable production techniques that will permit you to integrate several parts into one. (Cold forming is worth investigating.) 2. Develop new product designs that will eliminate expensive tooling and reduce finishing costs. 3. Smaller suppliers must learn to sell service and design knowhow as well as ability to make the product. Plenty of firms have men who can read blueprints. Only a few can come up with new part designs that will cost less to build and work better than their predecessors.

NEW LEADED STEELS FROM RYERSON

Now, machine parts faster than ever before

NEW LEDLOY 170 TUBING

average machining speed 170 surface feet per minute

Here's the fastest-machining steel tubing ever produced —and only Ryerson has it available for immediate shipment from stock. Ledloy® 170 is a cold drawn, seamless product of low carbon analysis with .15% to .35% lead added. It promises a minimum increase of 25% in productivity of machined parts or components. Sizes range from 1" to 2½" O.D. with maximum ⅜" wall thickness. Other sizes can be supplied promptly.

Part produced from Ledloy 170 Tubing for machining-comparison at National Metal Show.

NEW LEDLOY 375 BARS

average machining speed 375 surface feet per minute

This newest addition to Ryerson free-machining screw steel stocks is the world's fastest-machining steel. Assigning the figure 100 to B-1112 and using this as a base, Ledloy 375 has a machinability index of 205 plus. It rates about 64% higher than B-1113 and about 20% higher than Ledloy 300.

Ledloy 375 bars presently in Ryerson stocks include rounds in sizes from ¼" to 1", hexagons ¼" to ⅝".

Ask your Ryerson representative for complete details on these new steels. And call Ryerson for an unequaled selection of cold finished bars and tubing, including the largest stocks of Ledloy 300 (also known as Ledloy A) and Rycut® leaded alloys—the fastest machining in their carbon ranges.

MACHINING COMPARISON*
Ledloy 170 Tubing vs. Nonleaded Tubing

	Ledloy 170		MT-1015	
	Speeds	Feeds	Speeds	Feeds
Center drill	172 s.f.m.	.005"	110 s.f.m.	.005"
Form tool	172 s.f.m.	.0008"	110 s.f.m.	.0008"
Boring tool	172 s.f.m.	.007"	110 s.f.m.	.007"
Cutoff	172 s.f.m.	.0013"	110 s.f.m.	.0013"
Thread	27 s.f.m.	—	20 s.f.m.	—
Tap	18 s.f.m.	—	12 s.f.m.	—
Production time	35 seconds		49 seconds	

* As demonstrated at National Metal Show, Cleveland, 1958.

RYERSON CERTIFIED QUALITY

RYERSON STEEL®

Member of the INLAND® Steel Family

Principal Products: Carbon, alloy and stainless steel — bars, structurals, plates, sheets, tubing — aluminum, industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Ohio Rolls

shaping metal for all Industry

OHIO IRON AND STEEL ROLLS

CARBON STEEL ROLLS • OHIOLOY ROLLS • OHIOLOY "K" ROLLS
FLINTUFF ROLLS • DOUBLE-POUR ROLLS
CHILLED IRON ROLLS • DENSO IRON ROLLS
NICKEL GRAIN ROLLS • SPECIAL IRON ROLLS
NIOLOY ROLLS • FORGED STEEL ROLLS

The Ohio Steel Foundry Co.

LIMA, OHIO

LIMA... Virtually at the center of the steel industry

PLANTS AT LIMA AND SPRINGFIELD, OHIO

GEORGE L. RYLANDS
Cullman Wheel exec. v. p.

CLYDE E. ROSENE
Surface Combustion p. a.

DR. DONALD G. WILSON
Stromberg-Carlson San Diego

MILTON E. BERGLUND
president of Torrington Co.

George L. Rylands was elected executive vice president, **Cullman Wheel Co.**, Chicago. He was secretary and purchasing agent. **C. Casey** succeeds him as secretary. **Walter R. Whittle** was made assistant to the president, in addition to duties as director of advertising and marketing.

J. H. Carmichael, vice president, **Fairchild Engine & Airplane Corp.**, Hagerstown, Md., was elected president and chief executive officer. He succeeds **Richard S. Boutelle**, who was made vice chairman.

C. R. Welles was elected vice president-sales, **Hanna Furnace Corp.**, merchant pig iron division, Detroit, of National Steel Corp. He replaces **William Kerber**, retired. **Sherman B. Burke** succeeds Mr. Welles as sales manager.

Glenn H. Crocker was made general sales manager, **Roots-Connersville Blower Div.**, Connersville, Ind., Dresser Industries Inc. He replaces **W. W. Harris** who resigned in 1958.

Bernard J. Shallow, former general sales manager, was elected vice president-sales, **Marlin-Rockwell Corp.**, Jamestown, N. Y.

Crawford B. Murton was made sales manager, **Vesuvius Crucible Co.**, Swissvale, Pa. He succeeds **Richard H. Stone**, retired.

R. A. Brown was made director of the new research and development section at United States Steel Corp.'s **Consolidated Western Steel Div.**, Los Angeles, (Mayport plant).

Clyde E. Rosene was made purchasing agent, industrial division, **Surface Combustion Corp.**, Toledo, Ohio. His promotion follows retirement of **Morris Goodman.** Mr. Rosene has been assistant purchasing agent since 1943.

Dr. Donald G. Wilson was appointed general manager of the San Diego, Calif., facility of the electronics division of **Stromberg-Carlson Div.**, General Dynamics Corp. He succeeds **Harold P. Field**, recently named director of marketing, electronics division. Dr. Wilson was in Rochester, N. Y., serving as associate director of research and advanced development.

I. K. MacGregor was appointed vice president-staff operations, **American Metal Climax Inc.**, New York. He was vice president-eastern operations of Climax Molybdenum Co., division.

John S. Collbran Jr. was appointed Pacific district manager at Los Angeles for **New Jersey Zinc Co.**, newly established sales district for the area. He is replaced as western district sales manager, Chicago, by **J. P. Sheridan.**

M. E. Carruthers was named director of stainless steel research for **Armco Steel Corp.**, with headquarters at the central laboratories, Middletown, Ohio. He succeeds **Dr. A. L. Feild**, retired. **F. K. Bloom** was made manager, research laboratory, at the Baltimore Works, a position also formerly held by Dr. Feild. **M. W. Marshall** succeeds Mr. Carruthers as supervising research metallurgist.

Milton E. Berglund was elected president, **Torrington Co.**, Torrington, Conn. He succeeds **Walter C. Thompson,** who was elected chairman. **Rodney T. Dunlap** was elected executive vice president. Mr. Berglund has been executive vice president since 1955. Mr. Dunlap was elected a vice president in 1957. He transferred last August to Torrington from the Bantam Bearings Div., South Bend, Ind., where he served as vice president and general manager.

Robert E. Lewis was elected president, **Sylvania Electric Products Inc.**, New York. Formerly a senior vice president, he succeeds **Don G. Mitchell**, who continues as chairman.

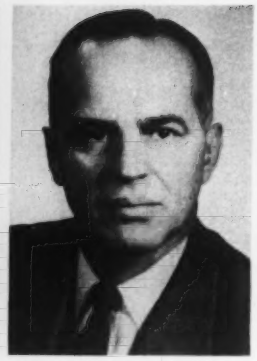
John L. Tullis succeeds **J. Pat Beaird**, resigned, as president and general manager of **J. B. Beaird Co.**, Shreveport, La., subsidiary of American Machine & Foundry Co. Mr. Tullis was executive vice president. Mr. Beaird had served as president since 1939. He will devote full time to a number of other interests.

Anthony B. Coburn was made production control manager by **Titeflex Inc.**, Springfield, Mass., subsidiary of Atlas Corp. He was production control manager, industrial hardware plant, Stanley Works.

Edward V. O'Neil, general manager of **Donner-Hanna Coke Corp.**, Buffalo, was elected vice president. He succeeds **Philip S. Savage**, retired.

Edward N. Fleming joined **Green River Steel Corp.**, Owensboro, Ky., as superintendent of maintenance. He was assistant to the executive

DONALD A. GAUDION



MERCER BRUGLER

Pfaudler Permutit president and chairman

THOMAS A. FRIBLEY

ROBERT E. THOMAS

Cleveland Cap Screw executive posts

vice president, H. H. Robertson Co.

Donald A. Gaudion was elected president of **Pfaudler Permutit Inc.**, Rochester, N. Y. He succeeds **Mercer Brugler** who was elected chairman. Mr. Brugler continues as chairman of the executive committee. Mr. Gaudion was executive vice president. **H. W. Foulds** has retired. He had been president of Permutit Co. since 1944, and upon its recent merger into Pfaudler Permutit Inc., was made chairman. **C. Wendell Beck** was made general manager of the Pfaudler Div., succeeding Mr. Gaudion, who has been acting in that capacity.

Edward F. Schweich was named executive vice president, **Lewin-Mathes Co.**, division of Cerro de Pasco Corp., St. Louis. He was secretary. **Harold E. Lewin** was made vice president in charge of metal purchasing; **Bram J. Lewin**, vice president-production; **Roderick J. Lewin**, vice president-sales. **James M. Dreyer** was named secretary; **Jerome J. Marx**, general sales manager; **Henry Stucke**, assistant general sales manager.

Westinghouse Air Brake Co. relocated purchasing departments serving the Pittsburgh divisions, and named **R. E. Moritz** manager of purchases, Air Brake and Industrial Products Divisions, with headquarters in Wilmerding, Pa.; and **H. I. McKeever** manager of purchases for the Union Switch & Signal Div. at Swissvale, Pa. **R. M. Hornbeck**, vice president-purchases and traffic, will supervise and co-ordinate all purchasing, traffic, and transportation activities from Pittsburgh headquarters.

Robert W. Sheehan was made plant superintendent; **Frank O'Connor**, chief of research, development and material control at Du-Co Ceramics Co., Saxonburg, Pa. Prior to joining Du-Co in 1956, Mr. Sheehan was a design engineer at the Radio Corp. of America plant at Findley, Ohio. Mr. O'Connor was laboratory chief for Trenton Potteries, Trenton, N. J.

Thomas A. Fribley was elected executive vice president, **Cleveland Cap Screw Co.**, Cleveland. He continues as secretary. **Robert E. Thomas**, general sales manager, was named vice president-sales.

Fischer & Porter Co., Hatboro, Pa., appointed **Frank P. Houpt** manager of its new systems application engineering department.

Oren W. Thompson was made chief engineer, **W. O. Barnes Co. Inc.**, Detroit.

Chrysler Corp., marine and industrial engine division, Detroit, appointed: **Bruce B. Spratling**, product sales manager; **M. J. Yost**, manager of field operations; **William M. Vollendorf**, advertising and sales promotion manager; **Robert C. Loman**, manager of parts and service.

J. Arnold Matthews was named assistant district sales manager, Birm-

EDWARD F. SCHWEICH

HAROLD E. LEWIN

Lewin-Mathes staff appointments

ROBERT W. SHEEHAN

FRANK O'CONNOR

Du-Co plant supt. and research head

1. Work piece is gripped by loader arms . . .

2. . . . which move piece to quenching die . . .

3. . . . where controlled flexing relieves strains before quenching.

New Gleason machine quenches gears *3 times faster* with minimum distortion

The unique, fully automatic method incorporated into the new Gleason No. 117 Quenching Machine makes it possible to quench gears and other parts faster than ever before without significant distortion.

The machine discharges a piece every 30 seconds; accommodates 17 pieces in process at one time.

Automatic handling. Once a part is deposited at the front of the machine, the No. 117 positions it on a quenching die and then clamps, flexes, and quenches it. Initial quenching takes only about ten seconds.

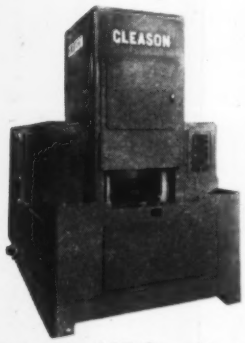
When the part cools past the critical hardening temperature, it is released from the dies. Still immersed in oil, the part then cools completely as it travels on a conveyor to the unload chute. As soon as part is released from dies, the machine is ready to receive another work piece.

Flexing before quenching. Each hot part is flexed between the dies to relieve internal stresses. Rate and number of flexes are easily preset. Hydraulic pressure produces positive diaphragming action.

Pulsing. All pressure on the work is pulsed momentarily throughout the die-quench. This permits work to contract without strain. During the die-quench, oil flows uniformly over and around the part.

Faster production. You can speed up production materially with the Gleason No. 117 Quenching Machine. It handles ring gears and cylindrical parts up to 10½″ in diameter and 8″ high. You can connect it with any conventional furnace so that parts are automatically fed to the quenching press. Push-button controls and timers are adjustable and easy to set. Dies can be changed quickly and easily.

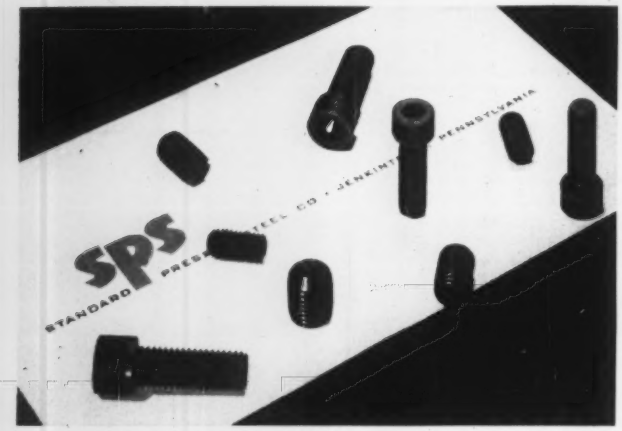
Gleason engineers are ready to help you step up productivity with this new machine. For complete details, write for bulletin.



Gleason No. 117 Quenching Machine

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.



Standard microsize UNBRAKO socket cap and set screws, #0 through #3, are supplied by your authorized industrial distributor in heat-treated alloy or stainless steel. Available with Nylok* self-locking feature.

Microsize UNBRAKO Socket Screws Simplify Fastening of Small Assemblies

Microsize UNBRAKO socket cap and set screws save both time and money in the design and assembly of your small devices. Precision manufactured, available locally, they eliminate the cost and delay of designing or procuring special screws to fasten tiny components. Use them in computers, servomechanisms, instruments, miniaturized electrical and electronic equipment—countless small, intricate devices where reduction in weight and bulk is required without sacrificing strength or reliability.

These miniature socket screws have all the advantages of larger UNBRAKOS. Deep, accurate sockets for non-slip, high-torque wrenching. Radii in socket corners to eliminate sharp angles where cracks start. Fully formed threads for greater strength and precision fit. Controlled fillets under cap screw heads to prevent shearing. Careful heat treat for maximum tensile values without brittleness or decarburization. Because of these features, microsize UNBRAKO socket cap screws are as much as 80% stronger than ordinary miniature cap screws, and microsize UNBRAKO socket set screws can be torqued tighter than ordinary miniature set screws. This extra strength means greater reliability in the fastening of your small assemblies.

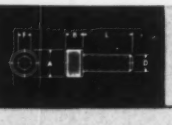
For more information, see your authorized SPS distributor. He carries microsize UNBRAKOS in both alloy steel and stainless in sizes #0, #1, #2 and #3. Or write us for Bulletin 2374 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

*T.M. Reg. U.S. Pat. Off., The Nylok Corporation

We also manufacture precision titanium fasteners / write for free booklet

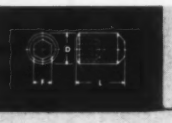
SPS Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standard Canada Ltd. • Unbrako Socket Screw Co., Ltd.



HEAT-TREATED ALLOY STEEL
Microsize UNBRAKO Socket Cap Screws
Class 3A Threads

Diameter		Threads per Inch NC	Threads per Inch NF	Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per 1000 in Pounds
#0	A .096		80	1/8		2.0	.21
	B .060		80	3/16		2.0	.22
	D .080		80	1/4		2.0	.26
	F .050		80	3/8		2.0	.33
#1	A .118		72	1/8		3.5	.31
	B .073		72	3/16		3.5	.36
	D .073		72	1/4		3.5	.42
	F .050		72	3/8		3.5	.53
#2	A .140	56		3/16	6.0		.54
	B .086	56		1/4	6.0		.61
	D .086	56		3/8	6.0		.76
	F 1/16	56		1/2	6.0		.91
#3	A .161	48		3/16	8.5		.77
	B .099	48		1/4	8.5		.87
	D .099	48		3/8	8.5		1.07
	F 5/64	48		1/2	8.5		1.27



HEAT-TREATED ALLOY STEEL
Microsize UNBRAKO Socket Set Screws
Class 3A Threads—Plain Cup Point

Diameter		Threads per Inch NC	Threads per Inch NF	Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per 1000 in Pounds
#0	D .060		80	1/16		.5	.03
			80	3/32		.5	.04
			80	1/8		.5	.05
	F .028		80	5/32		.5	.06
			80	3/16		.5	.08
			80	1/4		.5	.11
#1	D .073		72	1/16		1.5	.04
			72	3/32		1.5	.06
			72	1/8		1.5	.08
	F .035		72	5/32		1.5	.11
			72	3/16		1.5	.13
			72	1/4		1.5	.19
#2		56		1/16	1.5		.05
		56		3/32	1.5		.07
	D .086	56		1/8	1.5		.107
	F .035	56		5/32	1.5		.15
		56		3/16	1.5		.19
		56		1/4	1.5		.273
#3		48		3/32	5.0		.10
		48		1/8	5.0		.135
	D .099	48		5/32	5.0		.18
	F .050	48		3/16	5.0		.235
		48		1/4	5.0		.32

HIGH RELIABILITY

SPS research is continually developing fasteners with higher and higher standards of predictable performance. By installing SPS high-reliability fasteners in your assemblies, you increase your overall product reliability.

For more information on the full meaning of reliability, write for a copy of the new SPS booklet "High Reliability."

YASH SNIDER
heads Hodag tech services

THOMAS D. BURLEY
Carpenter Steel sales post

DR. GERARD E. CLAUSSEN
Arcrods research director

ingham, for **Republic Steel Corp.**

Yash Snider, a research chemist, heads the newly formed technical services department of **Hodag Chemical Corp.,** Chicago. Hodag formulates and produces antifoam agents and surface active chemicals.

Frank U. Hayes resigned as vice president and assistant general manger, **Bullard Co.,** to assume new duties in January as president and general manager of Sperry Products Inc., Danbury, Conn.

Robert D. Teece was promoted from executive engineer to assistant to the executive vice president at **Harnischfeger Corp.,** Milwaukee. **Robert E. Meyer,** chief engineer, large excavator division, succeeds Mr. Teece. **Karl Schneider** succeeds Mr. Meyer.

Clifford W. Bishop was appointed manager of **Consolidated Electrodynamics Corp.'s** southwestern regional sales office in Dallas. He succeeds **Henry S. Black,** recently named director of CEC's DataTape Div. **James P. LaBarber** was made manager, New York district office.

Dr. A. L. Antonio returned to **Aerojet-General Corp.,** Azusa, Calif., as vice president-chemical division. He directed Aerojet's solid propellent research and development between 1944 and 1954. He has since been general manager, Chemical Div., General Tire & Rubber Co., parent firm.

Edgar J. Griesbaum was made sales manager, tubular products, **Laclede Steel Co.,** St. Louis. He succeeds **E. J. Winer,** retired.

Thomas D. Burley was named to the new post of manager of high temperature steel sales for **Carpenter Steel Co.,** Reading, Pa. He was sales representative, Pittsburgh office.

American Bridge Div., U. S. Steel Corp., named as regional contracting managers: **J. H. Long,** eastern area, New York; **D. J. Morfee,** central area, Pittsburgh; **P. J. Larson,** midwest area, Chicago; **Walter Schielke,** southern area, Houston; **J. C. Hamilton,** western area, Los Angeles.

J. A. McIlnay was elected to the new post of vice president-marketing, **Electric Storage Battery Co.,** Philadelphia. **Owen R. Slauson,** former general sales manager, succeeds Mr. McIlnay as vice president-domestic sales for **Ray-O-Vac Co.,** division at Madison, Wis. **C. J. Moore,** former sales manager, fills the new post of general sales and marketing manager, **Exide Industrial Div.,** Philadelphia.

Dr. Gerard E. Claussen was made director of research and welding engineering for **Arcrods Corp.,** Sparrows Point, Md. He formerly served as a metallurgist for Machlett Laboratories, Reid-Avery Co., and Union Carbide & Carbon Corp. (now Union Carbide Corp.).

George A. Dornin Jr. was appointed manager of ingot mold sales, **Shenango Furnace Co.** He is in the Sharpsville, Pa., office.

George Costello joined **Servo Corp. of America,** New Hyde Park, N. Y., as sales engineer in the government contracts department. He was New York district sales manager for Vickers Electric Products Div., Sperry Rand Corp.

G. B. Price was made executive assistant to the general manager, **Ford Div.,** Ford Motor Co., Dearborn, Mich. He is also in charge of the organization and systems department, and the administrative services department. Mr. Price was manufacturing planning manager.

Kuno H. Doerr Jr. was elected president, **Southern Peru Copper Corp.,** succeeding **Edward McL. Tittmann,** who was elected chairman and chief executive officer. Mr. Doerr will have offices in Lima, Peru, where Mr. Tittmann was stationed. Mr. Tittmann will be in New York. Southern Peru Copper is a joint venture of four American mining companies.

Daniel W. Schluter fills the new post of manager-advertising and

(*Please turn to Page* 136)

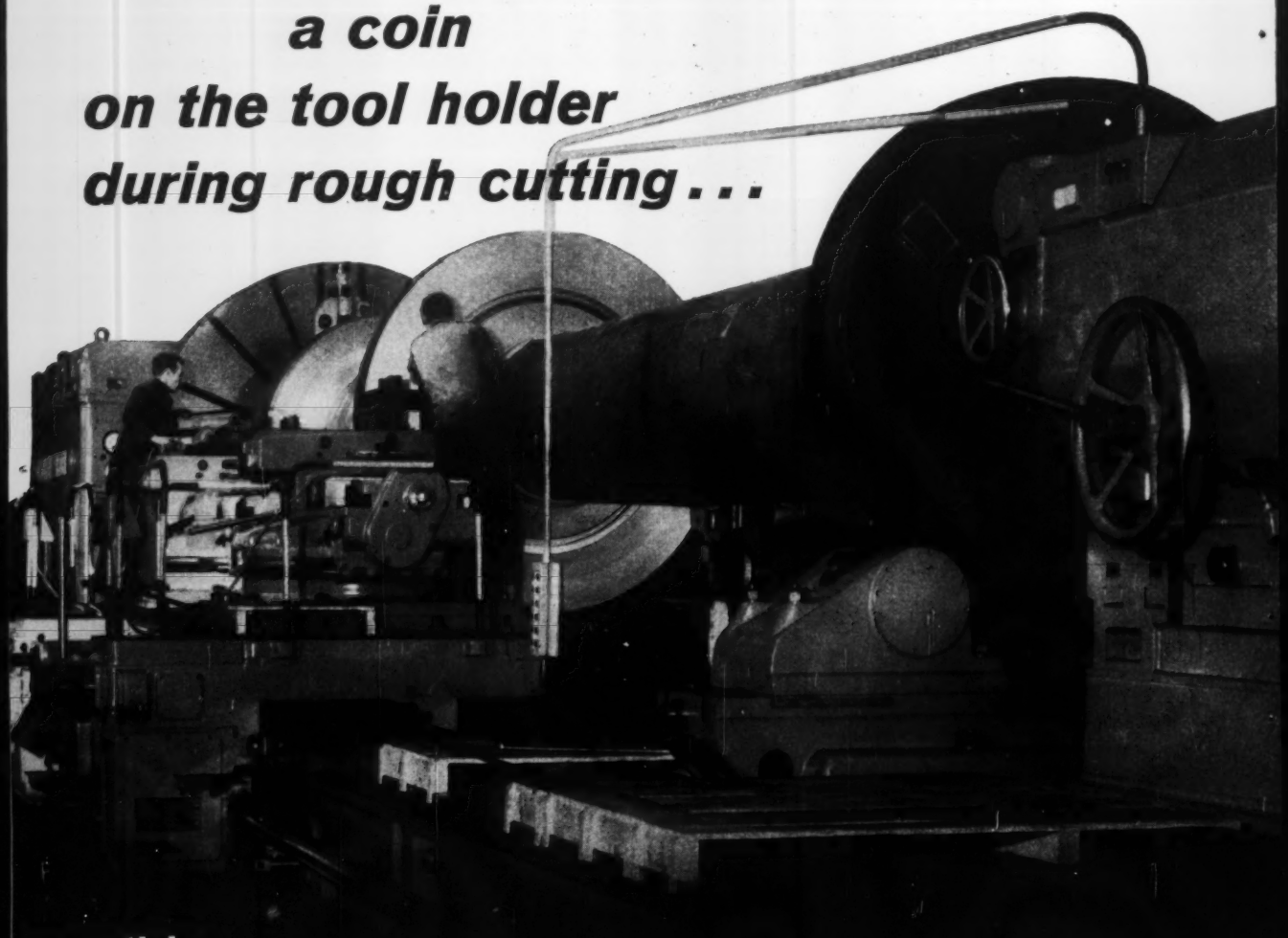
J. A. McILNAY

OWEN R. SLAUSON

C. J. MOORE

heads marketing and sales for Electric Storage Battery and divisions

you can balance a coin on the tool holder during rough cutting . . .



on this waldrich high speed lathe

Series WSD

- Rigid construction insures vibration-free operation with carbide tools.
- Maximum utilization of horsepower in main drive
- Rugged headstock
- Heavy duty tail stock
- 3-way and 4-way bed design
- Fast, efficient chip collecting

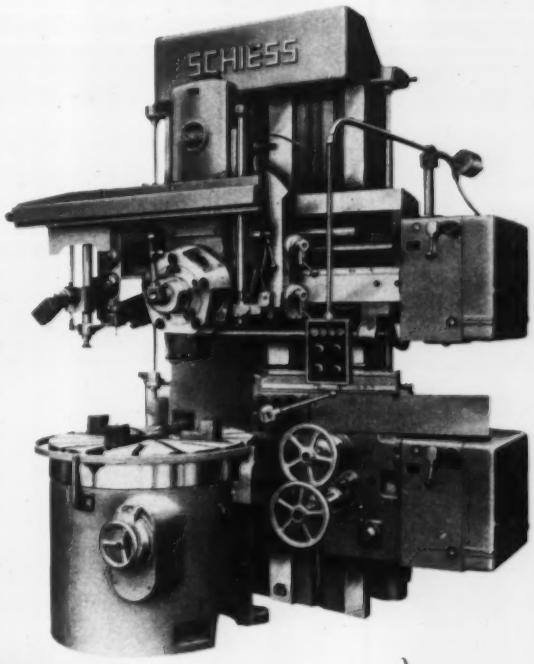
Write for details today.

WALDRICH SIEGEN

american waldrich mfg. corp.

1232 PENN AVENUE, PITTSBURGH 22, PENNSYLVANIA

Model KE Single Column Vertical Turret Lathes with 40″, 50″ and 65″ turning diameters for high-speed carbide machining.



Hydraulic pre-selection of speeds set by handwheel and read on illuminated dial. 16 spindle speeds—ratio 1:50—up to 310 rpm for carbide machining on Model KE 100. Table runs on tapered roller bearings.

Fingertip control for direction of feed and rapid traverse with spring-loaded mono-levers for normal direction plus angular compound feeds. Mono-levers move in same direction as desired feed or traverse movement, simplify correct setting by operator. Specially designed electro-magnetic disc clutches disengage feed instantly with no over-riding or coasting.

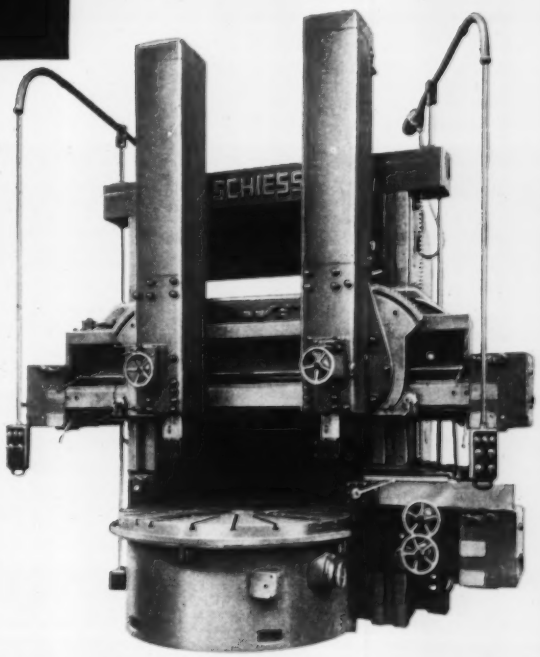
Counterbalanced cross rail and side head. Single lever unlocks, raises or lowers, and locks cross rail simultaneously by electro-mechanical controls. *No bolts or nuts to loosen or tighten by hand.*

Slip ring motor provides smooth "load sensitive" acceleration and braking. Variable speed as well as constant cutting speed available. Motor mounted on left side of machine with separate control enclosure. Fingertip control assured by pendant mounting of all necessary control functions. Electrics supplied from all U. S. manufacturers.

Copying attachment with electric tracer for use on cross rail or side head.

See why tool engineers call these heavy producers, "MOST MODERN MACHINES OF THEIR TYPE"

Model KZ Double Column Vertical Boring Mills with 65″, 80″, 98″ and 118″ turning diameters.



All operating features of KE Series Vertical Turret Lathes are combined in

SCHIESS KZ DOUBLE COLUMN VERTICAL BORING MILLS, PLUS—

Heads equipped with steel octagon rams can be swiveled—have automatic feed in vertical, horizontal and angular direction and are independent of one another as to amounts and direction of feed. Table, feed and rapid traverse controls are all contained in the pendant station. Standard model KZ Double Column Vertical Boring Mills are available with 65″, 80″, 98″ and 118″ turning diameters.

Get to know these products of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess engineer will be ready to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on these and other Schiess equipment.

SCHIESS

AMERICAN SCHIESS CORPORATION

1232 Penn Avenue, Pittsburgh 22, Pa.

MEN OF INDUSTRY

ALLISTAIR DUNN
Ohio Injector mfg.-dir.

CHARLES E. BEAVER
joins Buell Engineering

O. VICTOR PETERSON
Alcoa International post

R. J. WEBB
Marshall & Huschart v. p.

WILLIAM H. HARMAN JR.
I-T-E Circuit Breaker post

WILLIAM H. BENTON JR.
Anaconda Wire & Cable post

market research, **Tubular Rivet & Stud Co.**, Quincy, Mass. He was eastern district sales manager.

R. J. Webb was elected a vice president of **Marshall & Huschart Machinery Co.**, Chicago. He has been with the company for more than 20 years.

William H. Harman Jr. was named a product sales manager in the transformer and rectifier division, **I-T-E Circuit Breaker Co.**, Philadelphia. He is responsible for sales of transformers and Tranfo-Unit packaged substations. Mr. Harman was a sales engineer in the small air circuit breaker division.

Glidden Co., Cleveland, elected **Dr. William von Fischer** vice president-research; **James W. Pollard**, vice president-engineering.

Carel H. Neffenger was promoted to general sales manager, **G. S. Equipment Co.**, Cleveland, and affiliates.

William H. Benton Jr. was made general manager of mills, **Anaconda Wire & Cable Co.**, New York, subsidiary of Anaconda Co. He was manager of the company's Marion, Ind., mill from 1951 until 1957, when he was made assistant vice president-manufacturing, with headquarters in Hastings-on-Hudson, N. Y. **William L. Grey** fills the new post of vice president-general counsel for Anaconda Wire.

Carl E. Ingels was promoted to manager of manufacturing, **Atkins Saw Div.**, Indianapolis, Borg-Warner Corp. He was production and material control manager.

Dr. Kun Li, senior research engineer, research division, at the Graham Laboratory of **Jones & Laughlin Steel Corp.**, Pittsburgh, was promoted to research associate for the corporation.

William H. Mackey was made merchandising manager of **Martin Steel Corp.**, Mansfield, Ohio, a new post.

Allistair Dunn was named to head manufacturing operations for **Ohio Injector Co.**, Wadsworth, Ohio, as director of manufacturing, under a newly aligned production organization grouping. Mr. Dunn held a similar post with Blackhawk Mfg. Co. **Verland W. Belt**, plant superintendent at Wadsworth facilities, was named manager of Ohio Products Co., Orrville, Ohio, a subsidiary. Named to newly created posts for Ohio Injector are **John T. Lesko** as manager, manufacturing engineering; **Malcolm K. Sheppard Jr.** as manager, industrial engineering.

Charles E. Beaver joined **Buell Engineering Co. Inc.**, New York, in a sales and marketing capacity. He was vice president-sales, Research Cottrell Inc., subsidiary of Research Corp.

O. Victor Peterson, former chief industrial engineer for the smelting division, **Aluminum Co. of America**, Pittsburgh, was named manager of operations of **Alcoa International Inc.**, subsidiary. **Kenneth H. Hawkes** was elected treasurer of the subsidiary. **R. Kenneth Smith** was made assistant manager; **George V. B. Day**, chief analyst in Alcoa's commercial research division, Pittsburgh.

Charles R. Allen joined the staff of **D. K. MacLennan Co.**, Los Angeles, as technical representative for Misco Precision Casting Co., Whitehall, Mich.; and for Casting Engineers Inc., Chicago.

Bethlehem Pacific Coast Steel Corp appointed department superintendents at its Seattle steel plant: **J. H McKie** is labor and transportation superintendent; **T. J. Whinihan** roll shop superintendent; **J. P Dana**, superintendent of orders.

William J. Marcellus was named manager of the export division of **Fairbanks, Morse & Co.**, Chicago. He takes over duties of **John A. Cuneo**, vice president-export sales, who retired.

Burton T. Kehoe was named sales manager, packaged air conditioning equipment, **Unitary Equipment Div.**, Carrier Corp., Syracuse, N. Y. **Arthur E. Meling** was made manager of the division's technical services.

Where else can you buy so much cutting for so little tool cost?

Here's what you can do with DoALL Demon HSS Saw Blades

Tool Cost Per Cut	Square Inches Per Cut	Material	Time Per Cut	Blade
1.4¢	8.95	C-1137 3⅜" Diameter	50 Sec.	¾"—6 Pitch Demon Precision
¾¢	2.25	SAE 52100 1½" x 1½" Square	1.5 Min.	1"—8 Pitch Demon Precision
6.4¢	16.8	#321 Stainless Steel 4⅛" Diameter	7.3 Min.	1"—4 Pitch Demon Claw Tooth
5.1¢	19.63	SAE #1045 5" Diameter	1.96 Min.	1"—4 Pitch Demon Claw Tooth
4.6¢	28.27	AISI #1018 6" Diameter	2.46 Min.	1"—6 Pitch Demon Precision

THESE ARE MONEY-SAVING FACTS

The table above shows typical examples of DoALL Demon® Saw Blade performance. It brings you concrete evidence of the amazing efficiency of the low-price band saw's cutting edge in terms of tool costs *alone*. The extremely rapid cutting rates also offer a *direct* saving in labor cost.

Yet, the modern concept of band machining offers you many more substantial economies through the ability to take over scores of metal-cutting tasks presently handled by older methods.

CUTTING RATES INCREASED 650%

Under DoALL's intense development program progress in metal sawing has been so rapid that many users are not yet aware of the new savings available to them. For example, cutting rates average 650% faster than only a few years ago. And the versatility of the new band machines has greatly extended their application range. This is bringing substantial savings to hundreds of manufacturing operations.

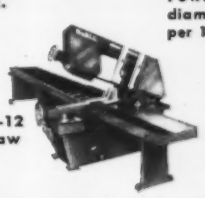
DoALL specialists can open your eyes to some new money-saving techniques. Why not call your local DoALL store today for a demonstration.

Model 26-3 Contour-matic machine slotting hydraulic pump rotors. Tool cost $1.06 per 100 rotors.

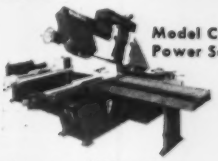
Model 16-3 Contour-matic parting silicon steel transformer cores. Tool cost $3.19 per 100 cuts.

Power Saw Model C-58 cutting 3¼" diameter AISI 1015. Tool cost $1.54 per 100 cuts.

Model 26-3 Contour-matic®



Model C-12 Power Saw



Model C-58 Power Saw

SB-64

A typical DoALL store

The DoALL Company, Des Plaines, Illinois

How to squeeze more production from your automatic forging equipment ...at no extra cost

AUTOMATIC forging machines are no better than the uniformity of the steel you process. When structural or chemical changes occur in the steel you're using you have to interrupt operations to adjust your equipment. And you lose the continuous production you paid for!

You can avoid these interruptions by using uniform steel. Timken® electric furnace fine alloy steel, for instance. It's uniform from bar to bar, heat to heat, order to order.

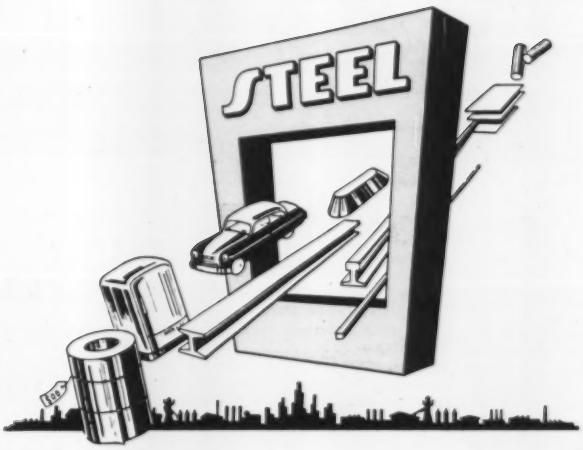
We take many extra quality-control steps to make sure it's uniform—many of them were American steel industry "firsts". For example, our magnetic stirrer for molten steel assures equal distribution of alloys, uniform temperature and working of the slag. A direct-reading spectrometer insures exactly correct composition to the very moment a heat is tapped. And individual order-handling assures uniformity that meets your own end-use requirements.

You'll squeeze the most production from your automatic forging equipment, at no extra cost, by specifying Timken fine alloy steel. You'll get uniform steel and faster, continuous production. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

TIMKEN *Fine Alloy* **STEEL**

TRADE-MARK REG. U. S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

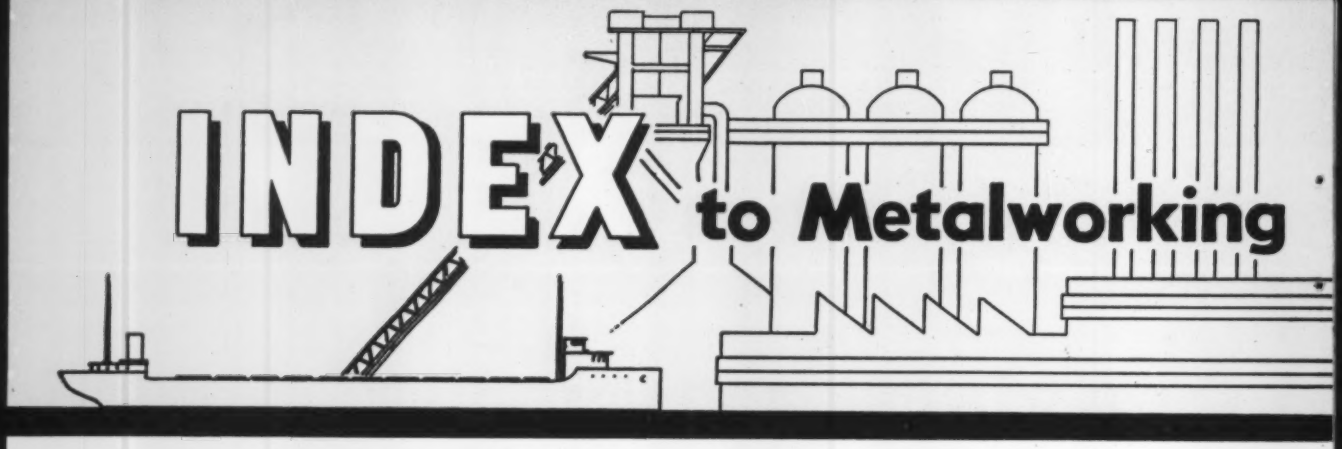


FACTS and FIGURES

of the metalworking industry

This is the eleventh annual edition of Metalworking Facts and Figures. It will help you throughout the year in analyzing markets and checking trends in prices, earnings, labor, and production in metalworking—the world's largest industry. If you'd like to have a complimentary copy of this 48-page reference section, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Copyright 1959, The Penton Publishing Co.



INDEX to Metalworking

Air Conditioning Equipment S-26
Air Handling Equipment... S-26
Air Washers S-26
Aircraft, Civil S-36
Aircraft Engines, Civil S-36
Alloy Steel Distribution S-10, S-11
Alloy Steel Production .... S- 9
Aluminum:
  Castings S-14
  Production, Primary S-22
  Production, Secondary .. S-22
  Wrought Products S-22
Antimony:
  Consumption S-22
  Imports S-22
  Production S-22
Appliances, Home .....
  ....S-30, S-31, S-32, S-33
Arc Welding Sets S-29
Automobiles:
  Exports S-34
  Imports S-34
  Production S-34
  Replacement Parts S-34
  Scrappage S-34

Backlogs, Manufacturing .. S-43
Barrels and Drums, Steel.. S-15
Batteries, Shipments S-35
Bauxite: Imports, Production S-22
Bearings Imports S-29
Bicycles Shipped S-34
Bituminous Coal S-47
Blowers S-26
Boilers, Steel Power S-27
Brass:
  Ingot Shipments S-20
  Prices S-19
Bronze Prices S-19
Building Cost Index S-48
Burners, Oil S-30
Bus Production S-35
Business:
  Failures and Liabilities.. S-44
Businesses:
  In Operation S-44
  New Incorporations S-44

Cabinets, Steel Kitchen.... S-32
Cans, Metal S-15
Carbon Steel Distribution S-10, S-11
Carloadings, Freight S-44
Castings:
  Aluminum and Aluminum-base Alloy S-14
  Aluminum and Aluminum-base Die S-12
  Copper and Copper-base Alloy S-14
  Copper and Copper-base Die S-12
  Gray Iron S-12
  High Alloy S-13
  Lead and Lead-base Die S-12
  Magnesium and Magnesium-base Alloy S-14
Castings (continued)
  Malleable Iron S-13
  Nonferrous S-14
  Steel S-13
  Zinc, Zinc-base Alloy... S-14
  Zinc and Zinc-base Die.. S-12
Chrome Ore S-23
Cleaners, Standard Vacuum S-32
Closures:
  Commercial S-15
  Home Canning S-15
Coal:
  Bituminous Consumption.. S-47
  Bituminous Output S-47
  Industrial Stocks S-47
Coal Chemical Prices S-18
Cobalt Prices S-19
Coffeemakers, Electric S-32
Coke Prices S-16
Coke Production S-46
Conduit and Fittings S-28
Construction:
  Equipment S-28
  Industrial Building Cost.. S-48
  New Houses S-48
  New Plant, Equipment.. S-48
  Put in Place S-48
  Valuation S-48
Consumer Price Index S-39
Containers and Closures:
  Commercial S-15
  Metal Cans S-15
  Steel Barrels, Drums, Pails S-15
Control Apparatus, Industrial S-26
Convectors S-31
Copper:
  Castings S-14
  Consumption in U. S. ... S-20
  Exports S-20
  Fabricators' Statistics S-20
  Imports S-20
  Prices S-19
  Production S-20
Corn Poppers, Electric S-32
Corporate Finances S-45
Cost Index, Industrial Building S-48
Cost-of-living Index S-39
Crowns, Shipments S-15

Debt, National S-45
Deep Fat Fryers S-32
Diecastings:
  Aluminum S-12
  Copper S-12
  Lead S-12
  Zinc S-12
Dishwashers, Electric S-32
Disposers, Waste Food..... S-33
Distribution:
  Alloy Steel S-10, S-11
  Carbon Steel S-10, S-11
  Finished Steel S-10
  Stainless Steel S-10, S-11
Dividends, Corporate S-45
Drills, Portable Well and Blast Hole S-28
Drums, Steel S-15
Dryers, Automatic Tumbler:
  Electric S-33
  Gas S-33
Durable Goods:
  Backlogs S-43
  Inventories S-43
  New Orders S-43
  Production (Sales) S-43

Earthmoving, Excavating Equipment S-28
Electricity:
  Output S-47
  Production Capacity, U. S. S-47
Electrodes, Welding S-29
Employment:
  Metalworking S-40
  Steel S-41
  Total U. S. S-41
Engines, Diesel, Gas, Gasoline S-29
Expenditures:
  New Plant, Equipment... S-48
  U. S. S-45
Exports, Auto S-34
Exports, Iron and Steel.... S- 7
Exports, U. S. S-44

Fabricated Structural Steel.. S-48
Fans S-32
Farm Equipment S-37, S-38
Federal Reserve Board Indexes:
  Durable Goods Production S-39
  Industrial Production ... S-39
  Metal Fabricating S-39
  Nondurable Goods Output S-39
  Primary Metals S-39
Ferroalloys, World Production S- 7
Ferrous Production ..... S- 9
Finances:
  Corporate S-45
  U. S. S-45
Fluorspar S-46
Foreign Trade S-44
Forgings, Steel ..... S- 9
Foundry Equipment, Sales.. S-27
Freezers, Electric S-32
Freight Carloadings S-44
Fuel S-46, S-47
Fuel Oil Consumption S-47
Furnaces:
  Floor and Wall S-30
  Forced Air S-30
  Gravity Air-Flow S-30
  Industrial S-28
  Warm Air S-30

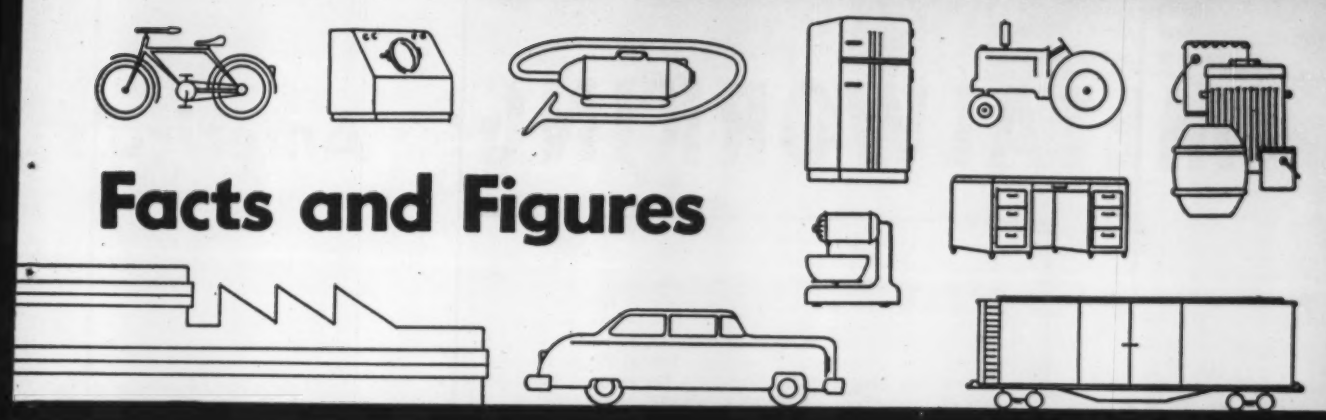
Gas, L. P.:
  Consumption in Steel Industry S-47
Gas, Natural:
  Consumption in Steel Industry S-47
  Sales S-47
Gears S-28
Generators S-27
Gray Iron Castings S-12
Grills, Electric S-32
Gross National Product S-45

Heat Treating S-27
Heaters, Electric, Portable.. S-32
Heaters, Electric Water S-33
Heaters, Gas Water S-33
Heaters, Unit S-26
Hot Plates S-32
Hours Worked:
  Agricultural Machinery and Tractors S-42
  Aircraft and Parts S-42
  Automobiles S-42
  Fabricated Structural Metal Products S-42
  Gray Iron Foundries S-42
  Machine Tools S-42
  Metalworking Industry .. S-40
  Metalworking Machinery. S-42
  Stamped and Pressed Metal Products S-42
  Steel Industry S-41
Houses Started S-48

Imports, Auto S-34
Imports, Bearings S-29
Imports, Iron and Steel S-6, S- 7
Imports, Tin S-23
Imports, U. S. S-44
Income, Corporate S-45
Income, National S-45
Induction Heating Equipment S-28
Industrial Heating Equipment S-28
Industrial Production Index. S-39
Industrial Supplies and Machinery S-27
Industrial Trucks S-26
Inventories, Manufacturing.. S-43
Iridium Prices S-19
Iron Ore:
  Consumption S-46
  Imports S-46
  Lake Shipments S-46
  Prices S-16
  Production S-46
  Stocks S-46
Iron and Steel:
  Exports ..... S- 7
  Imports .....S-6, S- 7
  Prices S-17
  World Production ...S-6, S- 7
Ironers, Standard Size S-32
Irons, Electric Flat S-32

Kitchen Cabinets, Steel S-32

Labor S-40, S-41, S-42
Labor Turnover S-42
Labor Union Membership... S-42
Lamps (Electric Bulbs) S-31



Facts and Figures

Lead:
Castings, Die S-12
Consumption S-21
Prices S-19
Production S-21
Locomotives S-35

Machine Tools, New Orders:
Forming Types S-25
Metal Cutting Types ... S-24
Machine Tools, Shipments:
Forming Types S-25
Metal Cutting Types S-24
Machine Tools, Used S-29
Machinery:
Backlogs S-43
Inventories S-43
New Orders S-43
Production (Sales) S-43
Machinery, Metalworking... S-25
Magnesium:
Castings S-14
Ingots S-23
Prices S-19
Wrought Products S-22
Malleable Iron Castings.... S-13
Manganese S-23
Manufacturers:
Backlogs S-43
Inventories S-43
New Orders S-43
Production (Sales) S-43
Material Handling Equip... S-26
Metalworking, Comparison with Other Industries ... S- 5
Metalworking Machinery... S-25
Metalworking Sales ....S-4, S- 5
Molybdenum S-23
Motor Vehicles S-34, S-35
Motors:
Electric S-27
Outboard S-29

New Orders, Manufacturers' S-43
Nickel Prices S-19
Nickel Production S-23
Nickel Silver Prices S-19
Nondurable Goods Production Index S-39
Nonferrous Metals:
Prices S-19
Production S-20, S-21, S-22, S-23

Office Machines S-27
Oxygen, Consumption S-47

Pails, Steel S-15
Payrolls, Steel S-41
Phosphor Bronze Prices ... S-19
Pig Iron:
Capacity ..... S- 8
Prices S-17
Production ..... S- 8
World Production ..... S- 7
Plant, Equip. Expenditures.. S-48
Platinum Prices S-19
Plumbing Fixtures S-31

Power S-46, S-47
Price Composites:
Finished Steel S-17
Pig Iron, Basic S-17
Pig Iron, Foundry S-17
Pig Iron, Malleable S-17
Scrap, Steelmaking S-17
Price Indexes:
Consumer S-39
Steel, BLS S-16
Wholesale S-39
Prices:
Coke, Beehive S-16
Coke, Oven Foundry ... S-16
Finished Steel S-16
Iron Ore, Lake Superior.. S-16
Prices, Average Monthly:
Chicago S-18
Coal Chemicals S-18
Eastern Pennsylvania ... S-18
Pittsburgh S-18
Prices, Nonferrous:
Aluminum S-19
Antimony S-19
Brass S-19
Bronze S-19
Cobalt S-19
Copper S-19
Iridium S-19
Lead S-19
Magnesium S-19
Nickel S-19
Platinum S-19
Silver S-19
Tin S-19
Zinc S-19
Production:
Alloy Steel ..... S- 9
Durable Goods S-39, S-43
Ferrous ..... S- 9
Industrial, Total..... S-39
Metal Fabricating S-39
Nondurable Goods S-39
Primary Metals S-39
Stainless Steel ..... S- 9
Steel, By Months ..... S- 8
Steel, By Years ..... S- 8
World, Steel ..... S- 6
Pumps:
Farm S-38
Industrial S-26
Purchasing Power of Dollar. S-45

Radiators S-31
Radios S-31
Railroad Cars:
Locomotives Put in Service S-35
Orders, Freight, Passenger S-35
Shipments—Passenger, Freight S-35
Ranges:
Electric S-33
Gas S-33

Raw Materials S-46, S-47
Receiving Tubes S-31
Refractories S-46
Refrigeration Equipment.... S-26
Refrigerators, Electric S-33
Resistance Welding Equipment S-29
Revenues, U. S. S-45

Sales (Production), Manufacturing S-43
Metalworking Industry... S- 4
Scrap:
Consumption by Industries S-46
Exports, Imports S-46
Iron and Steel S-46
Prices S-17, S-18
Screw Machine Products.... S-27
Shipbuilding:
Merchant S-36
Naval S-36
Shipments of Steel Products S-10, S-11
Silver Prices S-19
Silver Production S-23
Skillets, Electric S-32
Stainless Steel:
Distribution S-10, S-11
Production ..... S- 9
Stampings, Shipments S-29
Steel:
Alloy Distribution...S-10, S-11
Alloy Production ..... S- 9
Capacity ..... S- 8
Carbon Distribution..S-10, S-11
Castings S-13
Consumption for Metal Cans S-15
Fabricated Structural S-48
Finished, Distribution S-10, S-11
Ingots and Castings ... S- 8
Price Index, BLS S-16
Prices S-16, S-17, S-18
Production ..... S- 8
Shipments S-10, S-11
Stainless, Distribution S-10, S-11
Stainless, Production .... S- 9
Tool Steel ..... S- 9
World, Production ..... S- 6
Stoves:
Coal and Wood, Cooking S-32
Domestic Heating S-30
Oil, Cooking S-32

Taxes, Corporate S-45
Television:
Picture Tubes S-31
Sets S-31
Tin:
Consumption S-23
Imports S-23
Prices S-19
Production S-23
Tin (continued)
Stocks S-23
World S-23
Titanium Production S-21
Toasters, Electric S-32
Tool Steel Shipments ..... S- 9
Tractors, Shipments....S-28, S-37
Trade S-44
Trailers, Truck S-28, S-34
Transistors S-31
Transit Equipment S-35
Transportation...S-34, S-35, S-36
Trucks, Industrial S-26
Trucktrailers S-28, S-34
Tubes:
Receiving S-31
Television Picture S-31
Tungsten S-23
Typewriters S-27

U. S. Government:
Debt S-45
Expenditures S-45
Revenues S-45

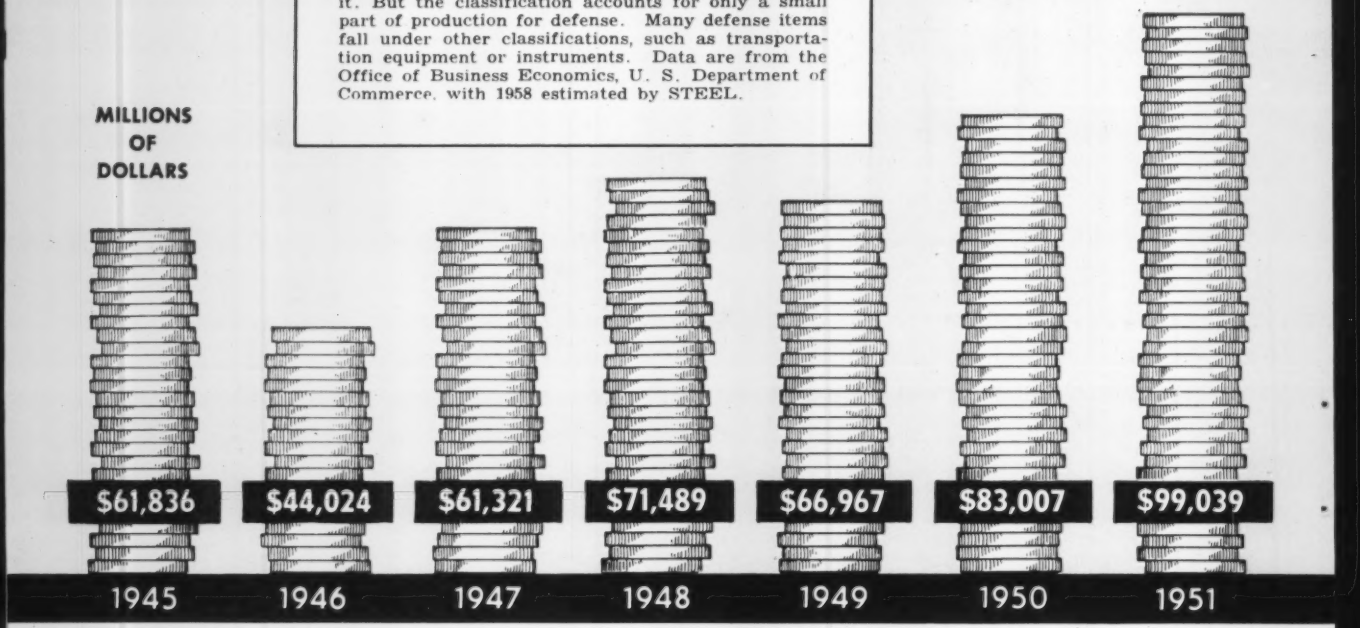
Vacuum Cleaners S-32

Waffle Irons, Electric..... S-32
Wages:
Agricultural Machinery and Tractors S-42
Aircraft and Parts S-42
Automobiles S-42
Fabricated Structural Metal Products S-42
Gray Iron Foundries..... S-42
Machine Tools S-42
Metalworking S-40
Metalworking Machinery. S-42
Stamped and Pressed Metal Products S-42
Steel Industry S-40, S-41
Washer-Dryers S-32
Washers S-33
Washers, Air S-26
Water Heaters, Electric.... S-33
Water Heaters, Gas S-33
Water Softeners S-32
Water Systems, Domestic... S-38
Welding Electrodes S-29
Welding Equipment S-29
Wholesale Price Indexes... S-39
Windmills S-38
Work Stoppages S-40

Zinc:
Castings S-14
Consumption S-21
Die-castings S-12
Mine Production S-21
Prices S-19
Slab S-21

METALWORKING: America's

Manufacturers' sales in the metalworking industry declined in 1958 because of the recession. At an estimated $119.5 billion, they were the fifth highest on record and 15 per cent below the record —1957's $140.5 billion. Ordnance is not included because the government does not reveal figures on it. But the classification accounts for only a small part of production for defense. Many defense items fall under other classifications, such as transportation equipment or instruments. Data are from the Office of Business Economics, U. S. Department of Commerce, with 1958 estimated by STEEL.



MANUFACTURERS' SALES IN METALWORKING INDUSTRY†

(Millions of Dollars)

New Standard Industrial Classifications	Primary Metals	Fabricated Metal Products	Machinery	Transpo.-tation Equipment	Instruments	TOTAL Metalworking Industry
1958*	22,700	17,400	45,300	31,100	3,000	119,500
1957	27,852	18,442	50,920	40,000	3,300	140,514
1956	28,339	17,683	47,856	36,037	3,623	133,538
1955	26,468	16,275	41,392	38,402	3,373	125,910
1954	20,106	14,712	38,497	31,615	3,056	107,986
1953	23,841	15,203	41,634	37,028	3,182	120,888
1952	20,725	13,625	38,402	29,582	2,886	105,220
1951	23,087	13,655	33,989	25,606	2,702	99,039
1950	19,046	11,710	27,114	22,651	2,486	83,007
1949	14,743	9,160	22,369	18,717	1,978	66,967
1948	17,153	10,200	24,618	17,475	2,043	71,489

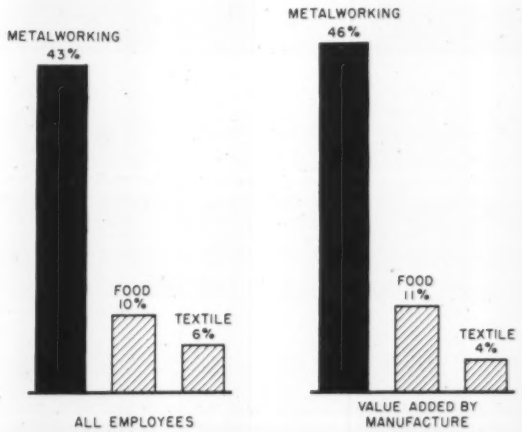
Former Industry Group Classifications	Iron-Steel and Products	Nonferrous Metals and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1948	22,188	5,946	9,024	15,658	13,662	3,818	70,296
1947	19,172	5,633	8,299	13,697	11,478	3,042	61,321
1946	14,202	4,705	5,658	9,824	6,624	3,011	44,024
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836

†Figures for 1948 and later represent a shift to the Standard Industrial Classification system. Data for 1948 are presented on the old industry group classification as well as the new. Figures for 1948 and later are not adjusted for seasonal variation.
*Estimates for 1958 are by STEEL. Figures for other years (except instruments) are from Office of Business Economics. Instrument figures for 1950 through 1958 are estimated by STEEL.

Greatest Industry

*Estimated.

HOW METALWORKING TOWERS OVER OTHER MANUFACTURING INDUSTRIES



Standard Industrial Classifications	TOTAL NUMBER PLANTS†	NUMBER OF EMPLOYEES‡	VALUE Added by Manufacture (000)‡
20. Food and Kindred Products	42,374	1,706,839	$15,373,644
21. Tobacco Manufactures	627	92,604	1,174,763
22. Textile Mill Products	8,070	1,043,752	5,302,818
23. Apparel and Related Products ..	31,372	1,271,241	5,807,054
24. Lumber and Wood Products....	41,484	698,406	3,654,944
25. Furniture and Fixtures	10,273	376,363	2,452,568
26. Pulp, Paper, and Products	5,004	564,994	5,509,316
27. Printing and Publishing	32,531	853,981	7,399,808
28. Chemicals and Allied Products..	11,075	760,490	11,592,142
29. Petroleum and Coal Products ..	1,381	183,988	3,098,311
30. Rubber Products	1,406	264,969	2,294,601
31. Leather and Leather Goods	4,845	366,821	1,850,188
32. Stone, Clay, and Glass Products	11,162	535,998	4,882,678
33. Primary Metal Industries	**5,838**	**1,319,404**	**13,403,254**
34. Fabricated Metal Products	**22,516**	**1,101,839**	**8,933,780**
35. Machinery (except Electrical) .	**25,601**	**1,717,731**	**14,968,445**
36. Electrical Machinery	**5,758**	**1,081,390**	**8,697,104**
37. Transportation Equipment	**5,348**	**1,791,749**	**16,174,615**
38. Instruments & Related Products	**3,142**	**296,701**	**2,543,096**
Total Metalworking Industry	**68,203**	**7,308,614**	**$64,720,294**
39. Miscellaneous Manufactures	17,010	675,011	4,569,839
Administrative and Auxiliary ..	4,187	474,256	.....

†1954 Census of Manufactures. ‡1956 Survey of Manufactures.

World Iron & Steel

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTING OUTPUT

	1958a	1957	1956	1955	1954	1953	1952	1951
World Totals	294,437,230	321,123,996	310,856,839	296,648,505	245,719,542	258,131,794	232,632,499	231,806,198
U. S.	84,750,000	112,714,996	115,216,149	117,036,085	88,311,652	111,609,719	93,168,039	105,199,848
Canada	4,770,750	5,038,000	5,307,600	4,534,656	3,195,025	4,116,110	3,703,050	3,568,770
Great Britain	22,343,070	24,303,000	23,138,000	22,165,470	20,742,400	19,721,520	18,388,050	17,515,120
Japan	12,918,960	13,856,000	12,217,040	10,348,470	8,524,990	8,428,420	7,687,240	7,151,980
India	1,915,800	1,916,000	1,946,560	1,908,704	1,886,975	1,687,280	1,767,580	1,679,660
Australia	3,487,670	3,260,000	2,915,560	2,916,480	2,486,400	2,294,880	1,817,760	1,649,870
South Africa	2,023,820	1,915,000	1,748,300	1,632,960	1,517,710	1,367,855	1,325,630	1,045,070
Brazil	1,750,000	1,760,000	1,465,200	1,282,600	1,263,130	1,117,930	982,630	927,300
Mexico	793,660	686,000	631,680	560,780	499,840	508,310	559,350	498,410
Spain	1,584,670	1,526,000	1,367,300	1,334,300	1,210,000	983,730	998,030	900,020
Sweden	2,560,640	2,696,000	2,637,800	2,338,600	2,048,200	1,960,200	1,857,900	1,677,500
Austria	2,657,240	2,766,000	2,285,800	2,005,300	1,818,300	1,411,520	1,162,700	1,130,580
Yugoslavia	1,205,030	1,173,000	973,500	886,600	677,600	566,500	486,200	473,000
France (b)	16,571,980	15,540,000	14,738,350	13,851,200	11,689,700	10,996,700	11,953,700	10,818,500
Saar (b)	3,794,120	3,791,000	3,711,400	3,481,500	3,085,500	2,952,400	3,105,300	2,863,300
Belgium (b)	6,759,300	6,917,000	7,012,500	6,481,200	5,485,700	4,986,300	5,592,400	5,577,000
Luxembourg (b)	3,702,060	3,850,000	3,801,600	3,547,500	3,110,800	2,924,900	3,302,200	3,384,700
Italy (b)	7,092,200	7,481,000	6,498,800	5,934,500	4,627,700	3,850,000	3,888,500	3,307,590
The Netherlands (b)	1,542,340	1,306,000	1,146,420	1,070,520	1,020,360	945,450	753,500	608,300
Germany, West Zone(b)	26,175,220	27,014,000	25,507,900	23,469,600	19,177,400	16,962,000	17,386,600	14,856,600
Chile	430,000	440,000	419,980	319,670	353,840	345,020	287,860	196,210
Denmark	281,410	298,000	264,550	261,250	219,360	198,410	194,000	177,470
Finland	209,720	230,000	217,150	195,110	192,900	162,000	162,000	139,990
Norway	409,280	380,000	316,360	188,490	133,380	122,360	106,030	97,000
Turkey	165,080	194,000	212,740	207,230	186,290	179,670	168,650	148,810
Argentina	250,000	229,000	220,660	240,300	205,030	191,800	138,890	145,500
Rhodesia	75,000	77,000	64,000	49,600	36,380	27,560	39,650	30,860
Taiwan	100,000	96,000	58,420	44,090	27,560	22,050	16,530	17,640
Colombia	125,000	130,000	99,000	85,000	.....	.....	.....	.....
Free World Totals	210,444,040	241,592,996	236,140,319	228,377,765	183,734,122	200,640,594	180,981,999	185,786,598
Germany, Soviet Zone	3,280,450	3,191,000	3,014,000	2,758,800	2,454,100	2,394,700	2,082,300	1,707,200
Czechoslovakia	5,989,460	5,680,000	5,370,200	4,921,400	4,699,200	4,873,000	4,169,000	3,643,200
Poland	6,086,900	5,847,000	5,515,730	4,869,040	4,344,120	3,964,400	3,501,300	3,071,200
Hungary	1,812,180	1,653,000	1,567,610	1,791,900	1,640,100	1,697,300	1,535,600	1,357,400
Rumania	1,000,000	945,000	859,980	841,500	689,700	790,900	767,800	710,600
USSR	59,524,200	56,218,000	53,471,000	49,798,100	45,577,400	41,800,000	37,950,000	34,540,000
China	5,800,000	5,497,000	4,585,000	3,058,000	2,452,800	1,945,900	1,644,500	990,000
Bulgaria	200,000	190,000	143,000	82,000	65,000	14,000	.....	.....
North Korea	300,000	310,000	210,000	150,000	60,000	11,000	.....	.....
Iron Curtain Totals	83,993,190	79,531,000	74,716,520	68,270,740	61,985,420	57,491,200	51,650,500	46,019,600

(a) Estimated.
(b) Member of European Coal & Steel Community.

U. S. Steel Imports by Country of Origin

Eight Months, 1958—Net Tons

	Belgium, Luxembourg	Japan	West Germany	France	Great Britain	Netherlands	Australia	Other
Ingots, blooms, slabs, and billets	1,239	.....	17	11	33	.....	.....	1,273
Wire rods	17,184	33,723	18,904	7,246	15,356	30	.....	5,099
Concrete reinforcement bars	194,275	26,910	6,978	12,549	3	.....	.....	16,388
Carbon and alloy bars	29,383	1,339	311	5,374	240	.....	.....	4,066
Hollow bars and drill steel	.....	.....	12	.....	203	.....	.....	336
Skelp	.....	.....	.....	.....	.....	.....	.....	193
Plates	1,205	722	860	99	.....	.....	.....	2,116
Sheets and strip	3,380	30	488	77	77	.....	90	2,872
Tin and terne plate	.....	.....	.....	.....	9	.....	.....	19
Structurals	80,381	205	1,343	16,535	648	561	.....	7,743
Sheet piling	2,870	.....	276	.....	.....	.....	.....	.....
Rails and accessories	203	.....	460	69	19	.....	.....	2,537
Wheels and axles	.....	.....	.....	.....	.....	.....	.....	31
Pipe and tubing	4,922	809	29,366	16,753	16,914	2,127	21,817	17,142
Wire and wire nails	128,724	42,297	35,221	16,054	17,374	27,839	45	15,481
Totals	463,766	106,035	94,236	74,767	50,876	30,557	21,952	75,296

American Iron & Steel Institute.

PIG IRON AND FERROALLOY OUTPUT

(Includes ferroalloys made in electric furnaces, where available)

	1958a	1957	1956	1955	1954	1953	1952	1951
World Totals	209,075,370	232,455,000	220,979,558	211,555,443	174,488,126	184,936,228	168,097,490	165,547,143
U. S.	56,950,000	81,144,000	77,575,458	79,263,865	59,806,242	77,250,168	63,353,955	72,448,543
Canada	3,409,740	3,948,000	3,801,600	3,405,248	2,309,776	3,165,905	2,913,680	2,812,540
Great Britain	14,776,880	16,024,000	14,750,500	13,966,400	13,309,408	12,515,775	12,015,025	10,829,050
Japan	8,452,440	7,864,000	6,889,960	5,785,280	5,069,130	4,969,910	3,821,620	3,550,000
India	2,220,030	2,147,000	2,173,920	2,122,176	2,197,440	1,989,455	2,075,360	2,016,110
Australia	2,539,700	2,484,000	2,316,160	2,016,000	2,083,200	1,894,705	1,718,080	1,470,900
South Africa	1,687,180	1,574,000	1,501,700	1,433,824	1,319,360	1,347,360	1,244,320	866,880
Brazil	1,300,000	1,320,000	1,258,400	1,181,400	1,197,790	974,600	892,650	848,760
Spain	1,404,510	1,030,000	1,052,700	1,094,500	998,580	910,470	870,540	719,400
Sweden	1,482,690	1,548,000	1,500,000	1,371,370	1,101,320	1,163,140	1,213,300	936,100
Austria	2,090,900	2,161,000	1,912,900	1,658,470	1,489,290	1,456,180	1,291,840	1,153,900
Yugoslavia	847,890	812,000	694,100	565,400	405,650	309,750	317,460	288,800
France (b)	13,588,520	13,314,000	12,801,800	12,196,800	9,835,100	9,634,900	10,745,900	9,625,000
Saar (b)	3,411,620	3,492,000	3,334,100	3,166,900	2,746,700	2,620,200	2,805,000	2,605,900
Belgium (b)	6,033,990	6,158,000	6,337,100	5,929,000	5,087,500	4,639,800	5,269,000	5,335,000
Luxembourg (b)	3,606,170	3,713,000	3,647,600	3,393,500	3,081,100	2,990,900	3,383,600	3,472,700
Italy (b)	2,364,340	2,431,000	2,194,500	1,907,400	1,480,600	1,475,100	1,325,500	1,110,450
The Netherlands (b)	921,300	773,000	727,950	737,440	671,550	650,100	592,570	576,400
Germany, West Zone(b)	19,042,180	20,236,000	19,461,200	18,230,300	13,839,100	12,883,200	14,253,800	11,766,700
Chile	415,000	420,000	405,650	282,190	336,200	315,260	297,620	264,550
Denmark	44,680	66,000	61,730	60,630	44,090	39,700	39,700	36,380
Finland	110,790	142,000	113,540	125,660	81,570	87,080	119,050	111,330
Norway	574,740	614,000	491,630	392,420	271,170	305,340	300,930	270,060
Turkey	265,430	243,000	238,000	221,160	216,050	238,080	217,150	170,860
Mexico	558,210	485,000	450,840	343,920	261,250	266,760	336,200	279,980
Rhodesia	70,000	72,000	28,650	22,050	15,430	39,680	42,990	35,270
Argentina	35,000	37,000	31,310	38,580	43,650	40,010	35,050	20,940
Taiwan	25,000	22,000	17,640	15,400	15,400	7,700	9,920	7,700
Free World Totals	148,228,930	174,274,000	165,770,668	160,927,283	129,313,646	144,181,228	131,501,810	133,630,203
Germany, Soviet Zone	1,865,090	1,820,000	1,731,400	1,668,700	1,450,000	1,174,800	716,100	375,100
Czechoslovakia	4,108,490	3,968,000	3,637,700	3,280,200	3,062,400	3,069,000	2,563,000	2,370,500
Poland	4,120,390	4,059,000	3,909,400	3,423,310	2,929,080	2,528,900	1,960,200	1,734,700
Hungary	1,204,150	770,000	817,960	940,500	902,000	787,600	632,500	556,600
Rumania	675,000	660,000	646,030	626,450	475,200	501,600	419,980	370,040
USSR	42,328,320	40,800,000	39,329,400	36,641,000	32,970,000	30,250,000	27,720,000	24,310,000
China	6,500,000	6,060,000	5,137,000	4,048,000	3,355,800	2,443,100	2,583,900	2,200,000
Bulgaria	45,000	44,000	8,000	8,000	7,000	6,000	.....	.....
Iron Curtain Totals	60,846,440	58,181,000	55,208,890	50,628,160	45,174,480	40,755,000	36,595,680	31,916,940

(a) Estimated.
(b) Member of European Coal & Steel Community.

U. S. Exports of Iron and Steel Products

(Net Tons)

Products	8 Mo. 1958	1957	1956	1955	1954
Semifinished Steel	92,318	721,116	528,758	721,116	94,938
Shapes and Plates	374,612	1,075,112	671,559	505,009	443,058
Rails and Accessories	148,263	245,192	94,511	73,649	121,382
Bars and Tool Steel	64,220	214,100	296,900	205,393	89,587
Pipe and Tubing	491,530	1,185,697	782,966	350,155	465,357
Wire and Wire Products	20,030	38,374	55,265	48,063	43,728
Tin Mill Products	229,969	620,392	651,436	773,287	671,638
Sheets and Strip	426,938	1,076,306	1,075,352	1,194,217	729,329
Totals	1,847,880	5,176,289	4,156,747	3,870,889	2,659,017

American Iron & Steel Institute.

U. S. Imports of Iron and Steel Products

(Net Tons)

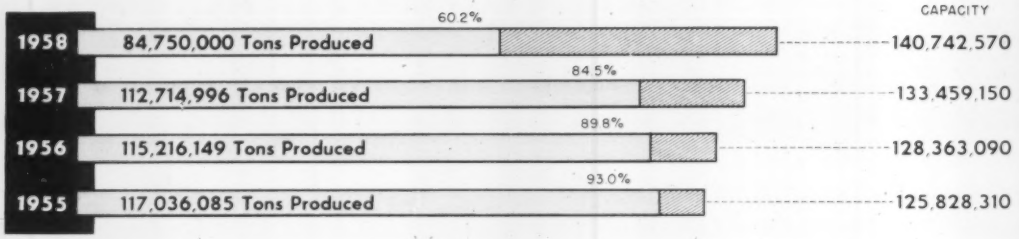
Products	8 Mo. 1958	1957	1956	1955	1954
Semifinished Steel	100,308	62,429	92,230	193,864	48,625
Shapes and Plates	115,564	365,491	573,261	202,192	209,906
Bars and Tool Steel	298,367	189,605	224,440	198,295	213,696
Pipe and Tubing	109,850	190,727	140,365	77,107	79,589
Wire and Wire Products	283,035	314,128	257,996	251,841	201,959
Other	10,361	31,322	46,046	46,723	29,882
Totals	917,485	1,153,702	1,334,338	970,022	783,657

American Iron & Steel Institute.

Production-Capacity

METALWORKING FACTS AND FIGURES

STEEL INGOTS AND STEEL FOR CASTINGS (Net Tons)



ANNUAL STEEL CAPACITY & PRODUCTION BY PROCESSES

	Open Hearth		Bessemer		Crucible		Electric		LD Process	TOTALS		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity‡	Capacity†	Production	Capacity
1958	122,321,830	.....	4,027,000	.....	40	....	13,312,700	.....	1,081,000	140,742,570	84,750,000*	60.2*
1957	116,912,410	101,657,776	4,505,000	2,475,138	40	‡	11,501,700	8,582,082	540,000	133,459,150	112,714,996	84.5
1956	112,317,040	102,840,585	4,787,000	3,227,997	40	‡	10,719,010	9,147,567	540,000	128,363,090	115,216,149	89.8
1955	110,234,160	105,359,417	4,787,000	3,319,517	40	‡	10,807,110	8,357,151	.....	125,828,310	117,036,085	93.0
1954	109,094,730	80,327,494	4,787,000	2,548,104	40	‡	10,448,640	5,436,054	.....	124,330,410	88,311,652	71.0
1953	102,677,980	100,473,823	4,637,000	3,855,705	40	‡	10,232,450	7,280,191	.....	117,547,470	111,609,719	94.9
1952	94,973,780	82,846,439	5,381,000	3,523,677	40	‡	8,232,850	6,797,923	.....	108,587,670	93,168,039	85.8
1951	91,054,020	93,166,518	5,621,000	4,890,946	20	‡	7,554,610	7,142,384	.....	104,229,650	105,199,848	100.9
1950	86,984,490	86,262,509	5,537,000	4,534,558	20	‡	6,871,290	6,039,008	.....	99,392,800	96,836,075	96.9#
1949	84,817,040	70,248,803	5,191,000	3,946,656	20	‡	6,112,870	3,782,717	.....	96,120,930	77,978,176	81.1
1948	83,610,690	79,340,157	5,226,000	4,243,172	20	‡	5,396,750	5,057,141	.....	94,233,460	88,640,470	94.1
1947	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	.....	91,241,250	84,894,071	93.0
1946	81,236,250	60,711,963	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	.....	91,890,560	66,602,724	72.5
1945	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	.....	95,505,280	79,701,648	83.5
1944	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	.....	93,652,290	89,641,600	95.5#
1943	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	.....	90,292,660	88,836,512	98.1#
1942	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	.....	88,569,970	86,031,931	96.8#
1941	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	.....	84,152,292	82,839,259	97.3#
1940	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	.....	81,619,496	66,982,686	82.1
1939	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	.....	81,828,958	52,798,714	64.5
1938	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	.....	80,185,638	31,751,990	39.6

*Estimated by STEEL. †As of Jan. 1. ‡Production included with electric steel. #Based on average annual capacity.
American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL INGOTS & CASTINGS

	Open Hearth		Bessemer		Electric		Totals		Calculated
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons Weekly
1958	.....	....	.....	....	.....	....	84,750,000*	60.2*	.....
10 Mo.	60,551,837	....	1,133,481	....	6,201,727	....	67,887,045	....	.....
Jan.	6,085,124	58.6	121,338	35.5	547,450	44.8	6,753,912	56.5	1,524,585
Feb.	5,252,112	56.0	81,597	26.4	448,614	40.6	5,782,323	53.6	1,445,581
Mar.	5,598,944	53.9	122,317	35.8	533,361	43.6	6,254,622	52.3	1,411,879
Apr.	4,875,619	48.5	109,433	33.1	547,939	46.3	5,532,991	47.8	1,289,741
May	5,602,123	53.9	110,366	32.3	588,670	48.2	6,301,159	52.7	1,422,384
June	6,378,942	63.4	88,125	26.6	660,413	55.8	7,127,480	61.6	1,661,417
July	5,712,587	55.0	114,218	33.4	593,600	48.6	6,420,405	53.7	1,452,580
Aug.	6,481,185	62.4	134,435	39.3	670,383	54.8	7,286,003	61.0	1,644,696
Sept.	6,769,660	67.3	103,194	31.2	737,518	62.3	7,610,372	65.8	1,778,124
Oct.	7,795,541	75.0	148,458	43.4	873,779	71.5	8,817,778	73.8	1,990,424
Nov.	.....	....	.....	....	.....	....	.....	....	.....
Dec.	.....	....	.....	....	.....	....	.....	....	.....
1957	101,657,776	87.0	2,475,138	54.9	8,582,082	71.3	112,714,996	84.5	2,161,776
Jan.	9,829,691	99.0	294,839	77.1	884,232	86.5	11,008,762	97.1	2,485,048
Feb.	8,898,671	99.2	277,682	80.4	810,853	87.8	9,987,206	97.6	2,496,801
Mar.	9,442,164	95.1	275,156	71.9	871,754	85.2	10,589,074	93.4	2,390,310
Apr.	8,820,328	91.8	231,731	62.6	762,721	77.1	9,814,780	89.5	2,287,828
May	8,842,707	89.1	201,864	52.8	747,752	73.1	9,792,323	86.4	2,210,457
June	8,498,903	88.4	210,915	57.0	681,584	68.9	9,391,402	85.6	2,189,138
July	8,086,519	81.4	194,638	50.9	627,575	61.4	8,908,732	78.6	2,015,550
Aug.	8,297,172	83.6	204,723	53.5	731,995	71.6	9,233,890	81.5	2,084,400
Sept.	8,135,139	84.7	185,967	50.2	656,800	66.4	8,977,906	81.8	2,097,642
Oct.	8,348,522	84.1	154,577	40.4	694,618	67.9	9,197,717	81.1	2,076,234
Nov.	7,674,698	79.9	134,709	36.4	583,512	59.0	8,392,919	76.5	1,956,391
Dec.	6,783,262	68.3	108,337	28.3	528,686	51.7	7,420,285	65.5	1,678,798

American Iron & Steel Institute. *Estimated.

PIG IRON †

CAPACITY & PRODUCTION

(Net tons)

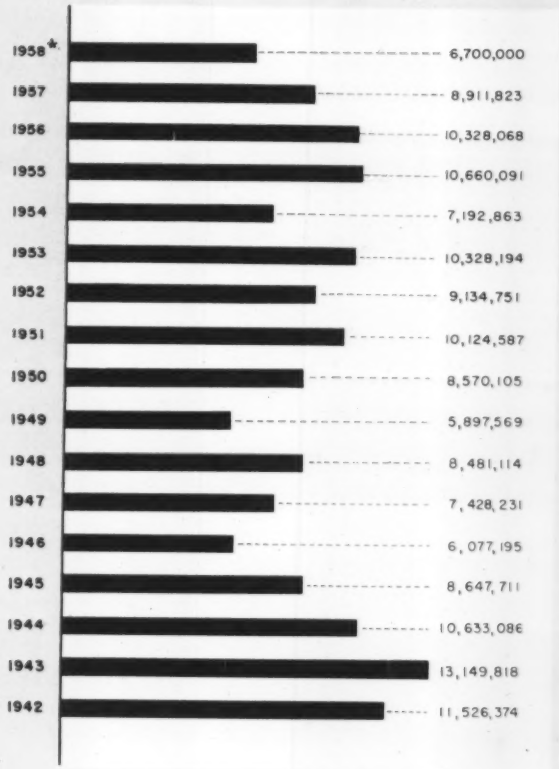
	Capacity	Production	%
1958	91,000,110	56,950,000*	62.6*
January	.....	4,854,444	62.8
February	.....	4,064,229	58.2
March	.....	4,463,953	57.8
April	.....	3,827,209	51.2
May	.....	4,073,796	52.7
June	.....	4,422,748	59.1
July	.....	4,304,183	55.7
August	.....	4,799,955	62.1
September	.....	5,072,390	67.8
October	.....	5,872,958	76.0
November	.....	.....	....
December	.....	.....	....
1957	86,817,950	79,338,932	91.4
1956	85,485,230	75,959,560	88.9
1955	83,971,100	77,789,684	92.6
1954	82,001,390	58,686,884	71.6
1953	79,380,240	75,856,872	95.6
1952	73,782,340	62,150,926	84.2
1951	72,471,780	71,227,750	98.3
1950	71,560,110	65,439,769	91.4
1949	70,541,850	54,175,534	76.8
1948	67,438,930	61,043,806	90.5
1947	65,709,200	59,314,348	90.3
1946	67,340,590	45,547,907	67.6
1945	67,313,890	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5

†Including ferroalloys made in blast furnaces. *Estimated by STEEL.
American Iron & Steel Institute.

Ferrous Production

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons



ALLOY STEEL PRODUCTION BY PROCESSES

(Including stainless steel)
Ingots and Castings—Net Tons

	Open Hearth				
	Basic	Acid	Totals	Crucible	Electric
1958‡	.....	.....	3,124,994	†	2,077,307
1957	5,745,682	169,898	5,915,580	†	2,996,243
1956	6,288,648	201,377	6,490,025	†	3,838,043
1955	6,735,450	185,473	6,920,923	†	3,739,168
1954	4,528,336	130,559	4,658,895	†	2,533,968
1953	6,599,038	185,341	6,784,379	†	3,543,815
1952	5,807,191	218,867	6,026,058	†	3,108,693
1951	6,585,635	238,034	6,823,669	†	3,300,918
1950	5,738,067	123,253	5,861,320	†	2,708,785
1949	4,192,344	105,550	4,297,894	†	1,599,675
1948	6,285,054	128,915	6,413,969	†	2,067,145
1947	5,520,540	128,754	5,649,294	†	1,778,937
1946	4,325,657	115,711	4,441,368	†	1,635,827
1945	5,572,353	274,889	5,847,242	18	2,800,451
1944	6,494,627	515,662	7,010,289	23	3,622,774
1943	8,539,523	677,416	9,216,939	136	3,932,743
1942	7,524,209	608,867	8,133,076	522	3,392,776

*Estimated.
‡First ten months.
†Included with electric steel.
American Iron & Steel Institute.

Stainless & Heat Resisting Steel Production

Net Tons of Ingots

Type Number	9 Mo. 1958	12 Mo. 1957	Type Number	9 Mo. 1958	12 Mo. 1957
201	7,912	9,715	348	767	3,802
202	11,796	15,813	403	9,020	19,533
301	24,169	53,813	405, 406	2,044	4,845
302, 302B, 303, 303Se	93,713	167,246	410	24,102	48,710
304	100,151	137,794	414	296	489
304L	10,544	22,347	416, 416Se	13,622	23,509
305	2,840	3,002	420	2,656	4,576
308	2,580	5,030	430	118,247	247,065
309	3,285	7,102	430F	1,067	2,397
309S	774	2,206	431	2,079	4,972
310, 310S	4,143	10,877	440A	1,201	1,447
316	23,581	44,478	440B, 440C	1,412	3,666
316L	9,940	14,666	442	378	537
317	428	6,129	443	72	385
321	17,087	35,702	446	885	2,470
347	10,114	10,809	All other	74,883	95,122
			Totals	592,462	1,043,719

American Iron & Steel Institute.

High Speed and Tool Steel Bars

(Excluding Hollow Drill Steel)
Shipments—Net Tons

Grade	C (Min)	Cr (Maximum)	W (Maximum)	Mo (Maximum)	V (Min)	V (Max)	Co (Min)	10 Mo. 1958	12 Mo. 1957
CLASS A HIGH SPEED STEEL									
I	0.60	4.5	6.75	5.5	2.1	Max	..	3,858	7,792
I-b	0.90	4.5	6.75	6.5	2.25	Min	..	538	1,037
I-c	0.60	4.5	6.75	5.5	2.2	Max	3.5	36	132
II	0.60	4.5	2.0	9.25	1.3	Max	..	2,437	5,283
II-c	0.60	4.5	2.0	9.25	2.2	Max	3.5	51	214
III	0.60	4.5	...	9.25	2.2	Max	..	696	3,242
III-c	0.60	4.5	...	9.25	2.2	Max	3.5	72	72
Totals								7,688	17,772
CLASS B HIGH SPEED STEEL									
IV	0.55	4.5	19.0	...	1.3	Max	..	892	1,926
IV-b	0.55	4.5	19.0	1.25	1.75	Min	..	80	149
IV-c	0.55	4.5	22.0	1.25	2.2	Max	3.5	384	716
Totals								1,356	2,791
OTHER TOOL STEELS									
V	All hot-work steel							7,191	11,924
VI	High chromium (4% Cr minimum) die steels							6,557	9,848
VII	All other alloy tool steels							28,203	45,647
VIII	Carbon tool steels, excluding hollow drill steel							6,755	12,327
Totals								48,706	79,746
Grand Totals								57,750	100,309

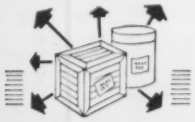
American Iron & Steel Institute.

Steel Forgings

Shipments for Sale—Net Tons

1958	Drop and Upset	Press and Open Hammer	Totals
Jan.	81,482	26,300	107,782
Feb.	69,895	23,188	93,083
Mar.	69,142	23,138	92,280
Apr.	60,588	21,946	82,534
May	56,656	21,822	78,478
June	65,301	21,301	86,602
July	50,828	16,587	67,415
Aug.	61,374	18,499	79,873
Sept.	70,001	18,976	88,977
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1957	1,120,428	376,147	1,496,575
Jan.	112,995	34,704	147,699
Feb.	102,172	32,842	135,014
Mar.	107,899	37,884	145,783
Apr.	103,367	35,643	139,010
May	100,803	34,509	135,312
June	92,942	35,535	128,477
July	79,099	24,978	104,077
Aug.	88,395	27,032	115,427
Sept.	86,327	30,582	116,909
Oct.	93,634	31,931	125,565
Nov.	79,328	25,448	104,776
Dec.	73,467	25,059	98,526
1956	1,256,125	414,182	1,670,307
1955	1,316,540	434,093	1,750,633
1954	1,049,803	351,688	1,401,491
1953	1,477,290	563,656	2,040,946

U. S. Bureau of the Census.



Distribution

METALWORKING FACTS AND FIGURES

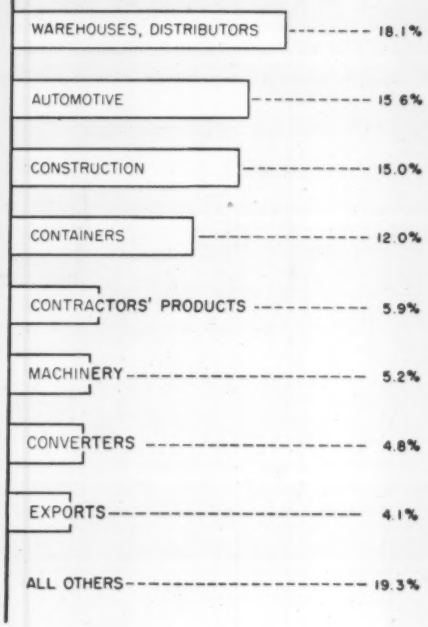
FINISHED STEEL DISTRIBUTION

By Market Classifications

(All Grades, Net Tons)	12 Mo. 1958*	12 Mo. 1957	12 Mo. 1956	12 Mo. 1955
Warehouses & Distributors	11,109,705	14,507,308	16,752,233	15,758,003
Automotive	9,587,980	14,227,096	14,141,887	18,721,880
Construction, including Maintenance	9,226,010	12,523,285	10,441,126	9,681,778
Containers	7,381,470	6,237,583	6,818,361	6,723,074
Contractors' Products	3,603,380	3,403,580	4,074,577	3,982,161
Machinery, Indus. Equip. & Tools	3,177,270	4,512,298	5,031,599	4,699,026
Converters & Processors	2,954,175	3,396,529	3,776,559	3,753,381
Export	2,544,155	4,568,795	3,622,427	3,583,077
Electrical Machinery & Equip.	1,800,905	2,085,675	2,437,804	2,291,866
Other Domestic & Commercial Equip.	1,752,305	1,837,940	2,263,775	2,189,416
Rail Transportation	1,562,845	4,149,074	4,226,654	3,520,849
Appliances	1,515,095	1,558,569	2,129,115	2,199,114
Agricultural	1,247,885	1,098,102	1,082,459	1,336,886
Shipbuilding, Marine Equip.	876,320	1,277,772	760,306	601,234
Bolts, Nuts, Rivets, Screws	805,775	1,149,545	1,485,087	1,475,340
Forgings (other than Automotive)	748,030	1,056,036	1,473,186	1,266,032
Unclassified	714,460	820,119	947,180	919,154
Oil & Gas Drilling	315,610	700,501	778,714	792,767
Ordnance, Other Military	266,560	356,406	523,890	826,527
Mining, Quarrying, Lumbering	192,260	328,803	349,508	268,987
Aircraft	62,805	99,561	134,721	96,892
Totals	61,445,000	79,894,577	83,251,168	84,717,444

*Estimated by STEEL on basis of shipments in first nine months.
American Iron & Steel Institute.

WHERE THE STEEL GOES
1958 — ESTIMATED

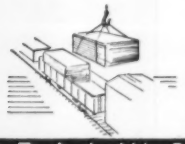


DISTRIBUTION
NET TONS

By Market Classifications

	STAINLESS STEEL and Heat Resisting			ALLOY STEEL (Other than Stainless)			CARBON STEEL		
	9 Mo. 1958	12 Mo. 1957	12 Mo. 1956	9 Mo. 1958	12 Mo. 1957	12 Mo. 1956	9 Mo. 1958	12 Mo. 1957	12 Mo. 1956
Converters & Processors	38,718	52,442	56,160	37,290	83,477	93,732	1,991,584	3,260,610	3,626,667
Forgings (other than Automotive)	7,210	15,014	27,136	211,195	400,165	534,862	305,131	640,857	911,188
Bolts, Nuts, Rivets, Screws	3,683	8,193	8,809	32,267	73,552	85,587	528,003	1,067,800	1,390,691
Warehouses & Distributors	122,788	206,284	227,465	217,321	513,905	605,908	7,435,440	13,787,119	15,923,436
Construction, including Maintenance	5,697	7,762	5,439	70,670	126,296	110,162	6,520,786	12,389,227	10,325,525
Contractors' Products	9,883	14,221	16,632	7,869	17,483	19,106	2,504,422	3,371,876	4,038,839
Automotive	43,325	106,303	101,487	687,294	1,432,613	1,619,252	5,837,560	12,688,180	12,421,148
Rail Transportation	239	1,987	3,710	58,245	221,062	212,316	1,035,333	3,926,025	4,010,628
Shipbuilding, Marine Equip.	1,897	2,342	2,290	73,519	99,590	71,517	537,910	1,175,840	686,499
Aircraft	10,369	25,815	33,990	21,619	46,461	73,095	11,968	27,285	27,636
Oil & Gas Drilling	417	812	1,368	55,720	167,970	230,169	164,755	531,719	544,215
Mining, Quarrying, Lumbering	265	522	464	11,306	28,985	31,908	122,989	299,296	317,136
Agricultural	229	621	1,213	17,068	28,192	29,674	856,083	1,069,289	1,051,572
Machinery, Indus. Equip. & Tools	30,074	50,899	56,936	258,768	539,604	676,384	1,934,892	3,921,795	4,298,279
Electrical Machinery & Equip.	7,193	13,391	19,728	279,858	461,128	598,236	973,382	1,611,156	1,819,840
Appliances, Utensils, Cutlery	26,201	34,610	44,413	7,214	10,686	21,158	1,026,983	1,513,273	2,063,544
Other Domestic & Commercial Equip.	8,458	14,148	15,315	9,309	18,189	29,567	1,208,651	1,805,603	2,218,893
Containers	911	1,739	2,904	10,183	26,255	35,722	5,155,109	6,209,589	6,779,735
Ordnance, Other Military	1,796	2,404	3,867	61,019	76,841	84,386	123,746	277,161	435,637
Export	10,178	26,271	22,054	104,147	217,604	209,596	1,666,300	4,324,920	3,389,163
Unclassified	17,536	33,975	36,319	76,426	153,155	186,076	406,080	632,989	724,785
Totals	347,067	619,755	687,699	2,308,307	4,743,213	5,558,413	40,347,107	74,531,609	77,005,056

American Iron & Steel Institute.

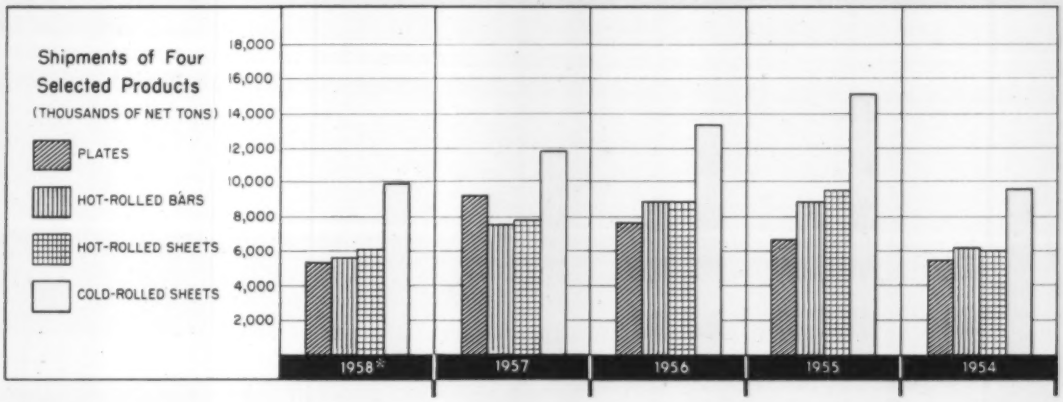


Steel Shipments

METALWORKING FACTS AND FIGURES

SHIPMENTS OF STEEL PRODUCTS

(All grades, including carbon, alloy, and stainless)



Steel Products—Net tons	Shipments	%	Shipments	%	Shipments	%	Shipments	%	Shipments	%
Ingots & steel castings	272,850	0.44	467,456	0.6	702,744	0.9	678,630	0.8	316,664	0.5
Blooms, slabs, billets, tube rounds, sheet bars, etc.	.....	..	.....	..	.....	..	2,744,477	3.2	1,530,025	2.4
Blooms, slabs, billets, sheet bars	1,118,500	1.82	2,307,901	2.9	2,275,640	2.7	.....	..	.....	..
Tube rounds	9,830	0.02	55,150	0.1	12,530	..	.....	..	.....	..
Skelp	117,360	0.19	152,949	0.2	197,825	0.2	191,591	0.2	129,679	0.2
Wire rods	892,180	1.45	961,913	1.2	1,132,434	1.4	1,203,842	1.4	760,885	1.2
Structural shapes (heavy)	4,118,960	6.70	6,817,796	8.5	5,348,981	6.4	4,736,987	5.6	4,501,183	7.1
Steel piling	460,840	0.75	569,673	0.7	434,103	0.5	391,345	0.5	387,654	0.6
Plates	5,385,970	8.77	9,248,625	11.6	7,714,623	9.3	6,782,258	8.0	5,340,262	8.5
Rails—Standard (over 60 lb)	584,440	0.95	1,194,406	1.5	1,201,354	1.4	1,150,977	1.3	1,113,366	1.8
Rails—All other	41,170	0.07	88,563	0.1	98,362	0.1	82,767	0.1	83,577	0.1
Joint bars	38,710	0.06	79,942	0.1	81,557	0.1	68,314	0.1	64,304	0.1
Tie plates	121,660	0.20	230,941	0.3	298,201	0.4	311,411	0.4	236,011	0.4
Track spikes	44,860	0.07	73,752	0.1	93,467	0.1	93,097	0.1	65,608	0.1
Wheels (rolled or forged)	165,900	0.27	386,512	0.5	345,396	0.4	306,406	0.4	192,483	0.3
Axles	78,650	0.13	210,760	0.3	171,780	0.2	119,246	0.1	60,956	0.1
Bars—Hot rolled (including light shapes)	5,627,550	9.16	7,567,400	9.5	8,840,349	10.6	8,798,261	10.4	6,255,465	9.9
Bars—Reinforcing	2,170,950	3.53	2,300,127	2.9	2,518,691	3.0	2,164,641	2.6	1,750,957	2.8
Bars—Cold finished	1,012,100	1.65	1,319,288	1.6	1,736,369	2.1	1,877,961	2.2	1,210,273	1.9
Tool steel	70,660	0.12	98,712	0.1	125,866	0.2	114,529	0.1	84,143	0.1
Standard pipe	2,292,710	3.73	2,664,469	3.3	2,927,308	3.5	2,968,241	3.5	2,320,265	3.7
Oil country goods	1,133,800	1.85	2,822,554	3.5	2,560,223	3.1	2,542,109	3.0	2,291,178	3.6
Line pipe	2,872,860	4.68	4,218,513	5.3	3,376,063	4.1	3,083,736	3.7	2,594,873	4.1
Mechanical tubing	552,390	0.90	773,945	1.0	949,846	1.1	965,829	1.1	674,214	1.1
Pressure tubing	256,230	0.42	395,346	0.5	384,988	0.5	276,068	0.3	277,208	0.4
Wire—Drawn	2,428,710	3.95	2,598,390	3.2	2,988,377	3.5	3,192,678	3.8	2,420,982	3.8
Wire—Nails & staples	459,610	0.75	447,301	0.6	557,283	0.7	650,956	0.7	567,382	0.9
Wire—Barbed & twisted	63,290	0.10	59,125	0.1	74,318	0.1	113,372	0.1	132,346	0.2
Wire—Woven wire fence	180,650	0.29	202,652	0.2	273,352	0.3	312,158	0.4	299,917	0.5
Wire—Bale ties	67,590	0.11	48,132	0.1	49,672	0.1	60,389	0.1	51,749	0.1
Black plate	696,890	1.13	610,108	0.8	765,055	0.9	797,720	1.0	672,803	1.1
Tin & terne plate—Hot dipped	520,540	0.85	649,974	0.8	950,070	1.1	1,100,782	1.3	1,307,096	2.1
Tin plate—Electrolytic	5,961,900	9.70	4,676,482	5.8	4,615,068	5.6	4,503,637	5.3	3,680,467	5.8
Sheets—Hot rolled	6,178,170	10.05	7,829,992	9.8	8,790,540	10.6	9,430,711	11.1	6,094,268	9.7
Sheets—Cold rolled	9,913,300	16.13	11,879,354	14.9	13,317,002	16.0	15,167,629	17.9	9,606,689	15.2
Sheets—Galvanized	2,881,150	4.69	2,392,637	3.0	2,957,991	3.5	2,864,497	3.4	2,362,632	3.7
Sheets—All other coated	176,960	0.29	207,553	0.2	226,556	0.3	275,046	0.3	178,961	0.3
Sheets—Enameling	.....	..	.....	..	.....	..	.....	..	150,218	0.3
Electrical sheets & strip	477,430	0.78	618,863	0.8	813,381	1.0	791,043	0.9	588,851	0.9
Strip—Hot rolled	1,020,700	1.66	1,392,460	1.7	1,796,157	2.2	2,089,491	2.5	1,486,141	2.4
Strip—Cold rolled	976,980	1.59	1,274,262	1.6	1,544,646	1.8	1,734,629	2.1	1,281,993	2.0
Total steel products	61,445,000	100.00	79,894,577	100.0	83,251,168	100.0	84,717,444	100.0	63,152,726	100.0

1958 SHIPMENTS OF FINISHED STEEL BY TYPES

(Net tons)

	Carbon	Alloy	Stainless	Totals
Jan.	4,863,518	310,344	41,555	5,215,417
Feb.	3,967,842	259,924	35,169	4,262,935
Mar.	4,153,606	259,566	35,354	4,448,526
Apr.	4,106,985	232,064	33,922	4,372,971
May	4,383,961	229,959	35,579	4,649,499
June	5,398,838	293,553	46,471	5,738,862
July	3,877,295	172,122	32,327	4,081,744
Aug.	4,543,610	251,248	40,165	4,835,023
Sept.	5,045,232	294,493	46,567	5,386,292
Oct.	5,839,861	336,758	47,921	6,224,540
10 Mo.	46,180,748	2,640,031	395,025	49,215,804

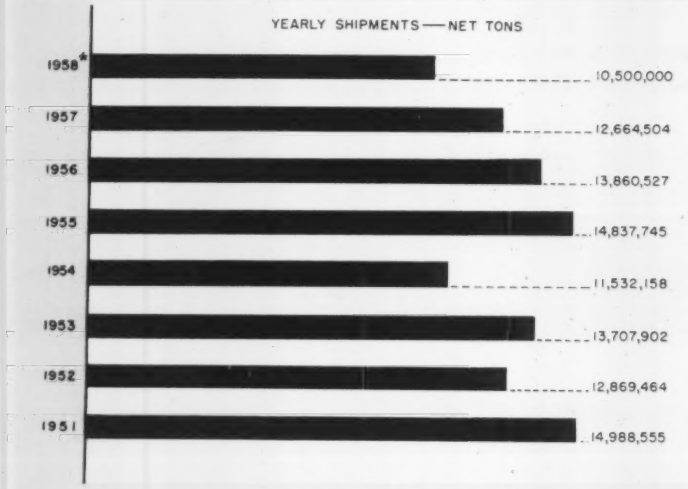
American Iron & Steel Institute.

*Estimated.

Castings

METALWORKING FACTS AND FIGURES

GRAY IRON CASTINGS



Shipments—Net Tons

	Miscellaneous	Ingot Molds	Chilled Iron Railroad Car Wheels	Cast Iron Pressure Pipe & Fittings	Cast Iron Soil Pipe & Fittings	For Sale	For Own Use
1958							
9 Mo.	4,399,692	1,266,250	205,322	964,805	586,519	4,261,751	3,160,837
Jan.	580,545	135,110	23,511	78,863	50,226	436,398	431,857
Feb.	503,175	116,168	25,959	67,606	40,398	389,708	363,598
Mar.	499,751	125,887	24,777	87,716	57,437	446,822	348,746
Apr.	483,999	121,489	25,401	112,292	63,539	457,498	349,222
May	469,026	134,312	23,498	123,017	70,201	472,192	347,862
June	503,252	135,477	22,928	129,671	76,620	541,904	326,044
July	430,883	157,478	19,928	110,790	72,481	465,650	325,910
Aug.	410,876	165,006	18,537	129,157	78,897	513,862	288,611
Sept.	518,185	175,323	20,783	125,693	76,720	537,717	378,987
Oct.	.....	.....	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....	.....	.....
1957	7,786,229	2,409,290	359,332	1,351,345	758,308	6,876,497	5,788,007
Jan.	761,697	261,964	31,139	101,069	57,346	642,317	570,898
Feb.	705,585	230,126	30,079	89,146	48,182	582,010	521,108
Mar.	713,767	214,775	36,995	108,158	59,451	604,481	528,665
Apr.	699,395	192,199	36,979	128,710	63,066	611,443	508,906
May	674,460	192,336	34,406	141,685	69,209	625,496	486,600
June	630,513	193,640	32,087	131,360	70,864	599,494	458,970
July	565,897	190,434	31,209	106,532	60,030	523,489	430,613
Aug.	630,130	205,655	28,976	138,209	72,987	596,779	479,178
Sept.	579,444	202,914	23,681	119,689	64,411	563,477	426,662
Oct.	668,895	210,521	26,306	122,149	71,683	601,109	498,445
Nov.	599,292	166,652	24,302	91,138	58,754	482,732	457,406
Dec.	557,154	148,074	23,173	73,500	62,325	443,670	420,556
1956	8,265,526	2,624,146	406,191	1,746,902	817,762	7,960,391	5,900,136
Jan.	769,826	257,150	32,408	131,346	58,788	675,941	573,577
Feb.	739,786	242,207	35,074	133,254	64,448	678,826	535,943
Mar.	752,498	254,045	42,676	132,384	73,802	715,173	540,232
Apr.	719,109	237,486	39,325	151,670	70,410	702,145	515,855
May	702,834	243,719	38,419	171,559	78,800	737,081	498,550
June	656,778	217,135	34,028	170,122	74,093	686,896	465,260
July	509,702	9,556	32,484	144,964	65,905	487,736	274,875
Aug.	639,953	170,857	31,712	180,249	80,424	671,523	431,672
Sept.	623,743	233,823	35,361	151,081	65,935	648,784	461,159
Oct.	749,200	252,203	30,978	171,377	70,976	734,384	540,350
Nov.	720,263	251,262	27,852	116,157	60,038	634,856	540,716
Dec.	681,834	254,703	25,874	92,439	54,143	587,046	521,947
1955	9,156,253	2,739,874	385,041	1,687,062	869,515	7,966,735	6,871,010
1954	7,291,912	1,784,625	336,239	1,375,671	743,711	6,322,989	5,209,169
1953	8,449,837	2,828,159	467,142	1,285,598	677,166	7,494,843	6,213,059
1952	8,122,274	2,238,309	544,896	1,312,518	651,467	7,371,700	5,497,764
1951	9,573,347	2,614,517	639,996	1,473,192	687,503	8,453,048	6,535,507

*Estimated.
U. S. Bureau of the Census.

DIECASTINGS

Shipments—Thousands of Pounds

Copper and Copper-Base

	1958	1957	1956
Jan.	894	1,008	797
Feb.	796	874	799
Mar.	823	878	780
Apr.	949	894	719
May	891	953	754
June	839	868	753
July	792	825	503
Aug.	682	799	902
Sept.	876	870	927
Oct.	...	1,057	1,118
Nov.	...	862	1,055
Dec.	...	888	968
Totals	...	10,776	10,075

YEARLY TOTALS

1955	8,512	1952	8,259
1954	6,509	1951	12,516
1953	10,077	1950	15,099

Aluminum and Aluminum-Base

	1958	1957	1956
Jan.	28,937	37,194	33,262
Feb.	25,579	34,311	32,959
Mar.	25,918	37,521	33,974
Apr.	21,956	33,493	31,792
May	21,091	31,602	29,823
June	18,292	29,700	25,037
July	17,714	25,339	23,501
Aug.	21,505	26,319	29,563
Sept.	26,254	29,400	31,649
Oct.	.....	31,936	37,792
Nov.	.....	29,793	33,938
Dec.	.....	26,978	32,940
Totals	.....	373,586	376,230

YEARLY TOTALS

1955	355,203	1952	169,732
1954	245,291	1951	151,465
1953	239,330	1950	167,201

Zinc and Zinc-Base

	1958	1957	1956
Jan.	50,144	67,969	67,817
Feb.	42,266	59,838	66,319
Mar.	39,240	61,391	65,553
Apr.	35,368	55,046	58,103
May	36,034	53,599	52,210
June	37,697	49,434	47,805
July	32,431	48,518	42,234
Aug.	35,469	49,873	52,284
Sept.	46,670	47,844	46,316
Oct.	.....	62,443	65,921
Nov.	.....	58,763	64,904
Dec.	.....	49,721	57,955
Totals	.....	664,439	687,421

YEARLY TOTALS

1955	769,480	1952	405,538
1954	513,902	1951	474,937
1953	515,033	1950	574,196

Lead and Lead-Base

	1958	1957	1956
Jan.	1,566	1,883	1,598
Feb.	1,294	1,435	1,636
Mar.	1,630	1,865	1,644
Apr.	1,467	2,070	1,910
May	1,655	2,373	1,919
June	1,971	2,336	1,833
July	1,394	2,079	1,551
Aug.	1,804	2,165	2,112
Sept.	1,725	2,115	1,539
Oct.	....	2,481	2,206
Nov.	....	1,590	1,788
Dec.	....	1,399	1,483
Totals	....	23,791	21,219

YEARLY TOTALS

1955	21,117	1952	20,941
1954	18,396	1951	25,936
1953	20,444	1950	20,977

U. S. Bureau of the Census.

Castings

METALWORKING FACTS AND FIGURES

STEEL CASTINGS

Shipments—Net Tons

	Carbon	Alloy, Including Stainless	For Sale	For Own Use	Totals
1958					
9 Mo.	598,132	238,412	636,471	200,073	836,544
Jan.	87,525	33,197	94,717	26,005	120,722
Feb.	74,283	29,014	79,708	23,589	103,297
Mar.	77,564	28,669	82,195	24,038	106,233
Apr.	65,639	25,825	69,121	22,343	91,464
May	61,105	25,897	66,086	20,916	87,002
June	67,227	25,634	71,624	21,237	92,861
July	46,858	21,944	48,618	20,184	68,802
Aug.	57,539	23,347	59,816	21,070	80,886
Sept.	60,392	24,885	64,586	20,691	85,277
Oct.	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....
1957	1,328,478	437,713	1,359,747	406,444	1,766,191
Jan.	125,389	43,851	133,826	35,414	169,240
Feb	114,805	40,127	121,667	33,265	154,932
Mar.	121,089	38,965	124,416	35,638	160,054
Apr.	122,894	39,604	124,549	37,949	162,498
May	124,840	39,735	125,431	39,144	164,575
June	116,759	36,888	119,353	34,294	153,647
July	91,730	30,288	90,037	31,981	122,018
Aug.	113,167	32,759	111,080	34,846	145,926
Sept.	106,261	32,741	105,611	33,391	139,002
Oct.	110,100	36,297	113,216	33,181	146,397
Nov.	93,343	33,772	98,436	28,679	127,115
Dec.	88,101	32,686	92,125	28,662	120,787
1956	1,444,768	487,219	1,512,290	419,697	1,931,987
Jan.	116,092	42,526	123,343	35,275	158,618
Feb.	123,279	42,119	128,598	36,800	165,398
Mar.	126,583	43,462	130,839	39,206	170,045
Apr.	121,723	41,985	125,015	38,693	163,708
May	134,919	43,306	142,025	36,202	178,227
June	122,483	42,178	129,147	35,514	164,661
July	88,971	29,013	96,350	21,634	117,984
Aug.	119,025	40,806	127,001	32,830	159,831
Sept.	116,905	38,141	121,705	33,341	155,046
Oct.	132,250	43,380	135,798	39,832	175,630
Nov.	122,212	41,902	126,900	37,214	164,114
Dec.	120,326	38,399	125,569	33,156	158,725
1955	1,088,489	442,205	1,166,706	363,988	1,530,694
1954	802,811	381,285	878,360	305,736	1,184,096
1953	1,276,729	557,468	1,400,013	434,184	1,834,197
1952	1,375,233	552,709	1,476,242	451,700	1,927,942
1951	1,541,480	508,574	1,506,903	543,151	2,050,054

U. S. Bureau of the Census.

MALLEABLE IRON CASTINGS

Shipments—Net Tons

	For Sale	For Own Use	Totals
1958			
9 Mo.	268,563	199,365	467,928
Jan.	34,920	27,814	62,734
Feb.	31,006	23,644	54,650
Mar.	29,624	22,084	51,708
Apr.	29,388	21,307	50,695
May	26,656	21,650	48,306
June	31,077	20,805	51,882
July	24,479	17,386	41,865
Aug.	29,414	19,838	49,252
Sept.	31,999	24,837	56,836
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1957	520,118	342,858	862,976
Jan.	51,508	34,469	85,977
Feb.	46,729	31,299	78,028
Mar.	48,311	29,702	78,013
Apr.	51,320	28,951	80,271
May	46,277	30,227	76,504
June	44,639	27,917	72,556
July	34,876	22,872	57,748
Aug.	39,644	25,782	65,426
Sept.	38,397	24,060	62,457
Oct.	45,989	31,678	77,667
Nov.	38,085	29,819	67,904
Dec.	34,343	26,082	60,425
1956	557,636	394,232	951,868
Jan.	54,618	38,944	93,562
Feb.	54,466	39,067	93,533
Mar.	46,266	40,675	86,941
Apr.	47,064	36,256	83,320
May	51,053	29,085	80,138
June	45,022	30,613	75,635
July	31,300	23,040	54,340
Aug.	43,479	30,943	74,422
Sept.	41,902	27,478	69,380
Oct.	50,219	31,309	81,528
Nov.	47,979	34,738	82,717
Dec.	44,268	32,084	76,352
1955	652,552	452,223	1,104,775
1954	461,925	360,091	822,016
1953	578,749	391,757	970,506
1952	573,472	352,648	926,120
1951	656,076	429,165	1,085,241
1950	536,945	405,279	942,224
1949	373,313	349,585	722,898
1948	527,192	413,992	941,184
1947	514,195	384,605	898,800
1946	452,355	299,673	752,028
1945	520,887	269,844	790,731
1944	619,588	258,645	878,233
1943	653,884	190,755	844,639
1942	590,804	155,204	746,008

U. S. Bureau of the Census.

HIGH ALLOY CASTINGS

Estimated Production by All U. S. Producers—Pounds

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1958	21,288,900*	28,165,360*	6,700,000*	56,154,200*
1st Qtr	5,679,400†	7,624,400†	1,820,000†	15,123,800†
2nd Qtr	5,344,300†	7,288,800†	1,730,000†	14,363,100†
3rd Qtr	4,665,200†	5,952,100†	1,450,000†	12,067,300†
4th Qtr	5,600,000*	7,300,000*	1,700,000*	14,600,000*
1957	31,596,900	35,938,400	8,128,400	75,663,700
1st Qtr	9,729,000	10,661,100	2,419,200	22,809,300
2nd Qtr	7,940,600	9,720,600	2,022,400	19,683,600
3rd Qtr	6,795,100	7,754,400	1,790,200	16,339,700
4th Qtr	7,132,200	7,802,300	1,896,600	16,831,100

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1956	37,987,500	36,705,800	10,553,700	85,247,000
1955	30,499,600	25,741,600	10,214,100	66,455,300
1954	29,108,300	24,316,300	8,426,600	61,851,200
1953	39,311,600	29,151,600	8,706,900	77,170,100
1952	40,807,600	26,197,800	7,827,500	74,832,900
1951	38,277,000	28,771,600	6,132,300	73,180,900
1950	26,894,000	19,033,200	3,321,200	49,248,400
1949	19,791,700	12,997,100	1,500,700	34,289,500
1948	24,030,400	16,285,200	2,525,300	42,840,900
1947	21,505,100	16,346,900	1,534,500	39,386,500
1946	20,398,800	15,150,400	1,860,700	37,409,900
1945	23,002,700	12,276,200	1,482,000	36,760,900

*Estimated. †Preliminary.
Alloy Casting Institute.

NONFERROUS CASTINGS

Zinc and Zinc-Base Alloy Castings

Shipments—Thousands of Pounds

	Die	All Other	Totals
1958			
9 Mo.	355,319	3,782	359,101
Jan.	50,144	424	50,568
Feb.	42,266	421	42,687
Mar.	39,240	479	39,719
Apr.	35,368	428	35,796
May	36,034	413	36,447
June	37,697	435	38,132
July	32,431	334	32,765
Aug.	35,469	391	35,860
Sept.	46,670	457	47,127
Oct.	.....	...	.....
Nov.	.....	...	.....
Dec.	.....	...	.....
1957	664,439	5,336	669,775
Jan.	67,969	509	68,478
Feb.	59,838	470	60,308
Mar.	61,391	502	61,893
Apr.	55,046	450	55,496
May	53,599	481	54,080
June	49,434	437	49,871
July	48,518	375	48,893
Aug.	49,873	470	50,343
Sept.	47,844	406	48,250
Oct.	62,443	404	62,847
Nov.	58,763	441	59,204
Dec.	49,721	391	50,112
1956	687,421	6,896	694,317
Jan.	67,817	704	68,521
Feb.	66,319	736	67,055
Mar.	65,553	678	66,231
Apr.	58,103	642	58,745
May	52,210	466	52,676
June	47,805	445	48,250
July	42,234	465	42,699
Aug.	52,284	509	52,793
Sept.	46,316	495	46,811
Oct.	65,921	589	66,510
Nov.	64,904	539	65,443
Dec.	57,955	628	58,583
1955	769,480	8,520	778,000
1954	513,902	6,556	520,458

U. S. Bureau of the Census.

Magnesium and Magnesium-Base Alloy Castings

Shipments—Thousands of Pounds

	1958	1957	1956	1955	1954
Jan.	1,881	3,207	2,959	2,307	2,451
Feb.	1,803	2,661	2,977	2,158	2,209
Mar.	1,975	2,970	3,046	2,576	2,425
Apr.	2,215	2,896	3,140	2,621	2,089
May	2,422	2,832	3,021	2,397	1,762
June	2,205	2,973	2,949	2,366	2,062
July	2,200	2,544	2,810	1,913	1,954
Aug.	1,869	2,315	3,059	2,172	2,190
Sept.	2,804	2,279	3,079	2,468	2,095
Oct.	....	2,192	3,442	2,299	2,092
Nov.	....	1,920	2,892	2,324	2,161
Dec.	....	1,533	2,794	2,253	2,287
Totals	....	....	30,322	36,168	27,854	25,777

YEARLY SHIPMENTS

1953	34,517	1951	30,825
1952	34,857	1950	15,224

U. S. Bureau of the Census.

Aluminum and Aluminum-Base Alloy Castings

Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Totals
1958					
9 Mo.	85,076	132,498	207,246	657	425,477
Jan.	10,724	18,082	28,937	102	57,845
Feb.	9,601	15,456	25,579	59	50,695
Mar.	9,311	15,255	25,918	63	50,547
Apr.	9,531	13,369	21,956	92	44,948
May	9,312	13,648	21,091	42	44,093
June	8,644	13,679	18,292	86	40,701
July	8,658	12,342	17,714	104	38,818
Aug.	9,034	14,426	21,505	69	45,034
Sept.	10,261	16,241	26,254	40	52,796
Oct.	....	.....	.....	..	.....
Nov.	....	.....	.....	..	.....
Dec.	....	.....	.....	..	.....
1957	144,121	232,326	373,586	1,623	751,656
Jan.	14,201	20,963	37,194	641	72,999
Feb.	13,366	21,707	34,311	67	69,451
Mar.	13,914	22,974	37,521	118	74,527
Apr.	14,287	20,376	33,493	128	68,284
May	12,705	20,708	31,602	93	65,108
June	11,585	17,180	29,700	82	58,547
July	10,447	16,322	25,339	65	52,173
Aug.	10,966	18,398	26,319	52	55,735
Sept.	11,367	17,820	29,400	105	58,692
Oct.	11,570	20,543	31,936	91	64,140
Nov.	10,411	18,611	29,793	83	58,898
Dec.	9,302	16,724	26,978	98	53,102
1956	171,781	245,421	376,230	1,149	794,581
1955	165,482	298,349	355,203	1,746	820,780
1954	156,555	214,407	245,291	6,801	623,054
1953	214,553	200,025	239,330	4,114	658,022
1952	194,616	146,883	169,732	7,748	518,979
1951	193,378	160,011	151,465	10,277	515,131
1950	184,782	181,366	167,201	9,733	543,082

U. S. Bureau of the Census.

Copper and Copper-Base Alloy Castings

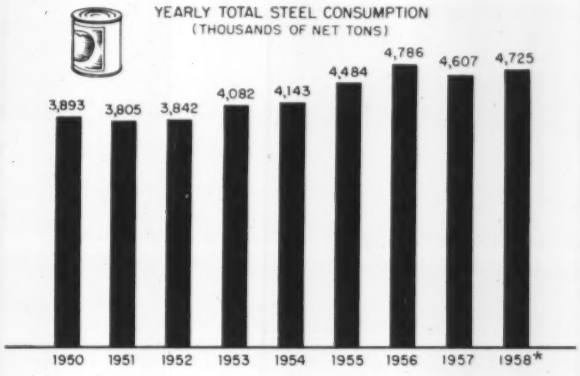
Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Totals
1958					
9 Mo.	484,804	27,052	7,542	16,124	535,522
Jan.	63,294	3,327	894	2,192	69,707
Feb.	52,579	3,202	796	1,779	58,356
Mar.	54,007	3,395	823	1,932	60,157
Apr.	53,271	3,386	949	1,705	59,311
May	51,634	3,077	891	1,904	57,506
June	51,967	3,001	839	1,317	57,124
July	46,636	2,351	792	1,345	51,124
Aug.	52,981	2,425	682	1,702	57,790
Sept.	58,435	2,888	876	2,248	64,447
Oct.	.....	....	....	....	.....
Nov.	.....	....	....	....	.....
Dec.	.....	....	....	....	.....
1957	789,014	44,789	10,776	30,048	874,627
Jan.	73,596	4,514	1,008	2,805	81,923
Feb.	64,247	4,191	874	2,676	71,988
Mar	69,164	4,448	878	2,837	77,327
Apr.	69,035	4,319	894	2,816	77,064
May	67,166	4,425	953	2,722	75,266
June	63,828	3,594	868	2,591	70,881
July	54,781	3,013	825	1,939	60,558
Aug.	64,884	3,282	799	2,203	71,168
Sept.	64,429	3,247	870	2,221	70,767
Oct.	74,365	3,697	1,057	2,695	81,814
Nov.	63,939	3,010	862	2,375	70,186
Dec.	59,580	3,049	888	2,168	65,685
1956	866,545	57,522	10,075	32,164	966,306
1955	905,867	63,111	8,512	31,408	1,008,898
1954	751,917	48,848	6,509	27,394	834,668
1953	888,369	61,316	10,077	30,734	990,496
1952	910,862	63,865	8,259	26,924	1,009,910
1951	1,075,437	69,883	12,516	39,607	1,197,443
1950	953,590	55,614	15,099	32,670	1,056,973

U. S. Bureau of the Census.

METAL CANS

Shipments in Terms of Net Tons of Steel Consumed



1958	Food Cans	Nonfood Cans	Totals	For Sale
10 Mo.	2,563,189	1,574,734	4,137,923	3,549,612
Jan.	190,949	132,699	323,648	269,259
Feb.	181,864	123,594	305,458	258,637
Mar.	213,521	138,691	352,212	304,212
Apr.	178,441	141,307	319,748	261,744
May	198,646	166,697	365,343	305,622
June	222,295	185,374	407,669	350,452
July	287,120	188,385	475,505	414,732
Aug.	415,647	174,033	589,680	520,655
Sept.	389,407	163,463	552,870	476,966
Oct.	285,299	160,491	445,790	387,333
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1957	2,827,866	1,778,675	4,606,541	3,962,109
Jan.	183,540	131,149	314,689	282,952
Feb.	161,711	118,736	280,447	234,193
Mar.	179,108	144,878	323,986	287,700
Apr.	336,117	170,859	506,976	446,336
May	176,595	162,728	339,323	280,920
June	205,201	156,573	361,774	308,196
July	271,056	181,938	452,994	404,235
Aug.	369,117	177,120	546,237	488,185
Sept.	346,941	148,953	495,894	430,362
Oct.	260,455	146,120	406,575	348,333
Nov.	169,411	116,025	285,436	242,053
Dec.	168,614	123,596	292,210	248,644
1956	3,011,980	1,773,691	4,785,671	4,113,401
Jan.	172,860	120,271	293,131	244,735
Feb.	176,999	122,671	299,670	251,964
Mar.	194,116	147,121	341,237	288,243
Apr.	322,941	160,687	483,628	424,140
May	183,298	155,069	338,367	279,136
June	224,299	180,784	405,083	345,430
July	266,336	182,193	448,529	396,151
Aug.	418,959	174,953	593,912	531,036
Sept.	392,158	141,103	533,261	458,039
Oct.	352,673	163,867	516,540	453,970
Nov.	154,249	110,920	265,169	219,267
Dec.	153,092	114,052	267,144	221,290
1955	2,801,601	1,682,398	4,483,999	3,909,855
1954	2,605,124	1,538,205	4,143,329	3,657,604
1953	2,614,764	1,467,490	4,082,254	3,571,489
1952	2,554,874	1,287,296	3,842,170	3,340,899
1951	2,558,591	1,245,960	3,804,551	3,309,592
1950	2,550,949	1,342,435	3,893,384	3,423,602

U. S. Bureau of the Census. *Estimated.

Metal Closures for Glass Containers

Shipments—In Thousands of Units

1958	Commercial Closures	Home Canning Closures
10 Mo.	11,178,218	12,923,970
January	1,230 531	524,493
February	1,238,862	544,561
March	1,593 563	681,791
April	1,090 963	918,498
May	1,097,588	1,832,819
June	1,220,176	2,222,459
July	1,095 233	1,884,689
August	1,259,266	2,506,483
September	1,352 036	1,808,177
October	1,329,623	542,069
November	.....	.....
December	.....	.....
1957	13,742,356	12,923,527
January	957,035	1,516,990
February	1,034,914	1,617,704
March	997,787	1,180,305
April	1,073,073	1,307,141
May	1,187,338	1,341,741
June	1,113,686	1,163,430
July	1,289,149	1,285,290
August	1,435,712	1,430,214
September	1,272,974	793,915
October	1,245,367	284,025
November	1,103,112	405,691
December	1,032,209	597,081
1956	14,217,467	14,305,032
1955	14,135,632	14,227,332
1954	12,705,438	14,031,151

U. S. Bureau of the Census.

Crowns

Shipments—In Gross

	1958	1957	1956
Jan.	29,518,438	20,854,903	22,835,265
Feb.	48,070,949	21,131 074	24,599,123
Mar.	14,867,451	26 313 951	35,063,728
Apr.	16,861,405	27,724,112	63,888,686
May	21,824,210	32,325,995	17,837,940
June	27,601,464	31,263,410	16 454,164
July	27,676,378	33,611,886	22,914,009
Aug.	26,591,418	30,317 394	25,999,603
Sept.	24,089,091	25,582 392	20,757,026
Oct.	23,944,794	23,970,416	20,438,847
Nov.	.....	18,193,501	18,126,773
Dec.	.....	22,483,036	21,287,667
Totals	.....	313,772,070	310,202,831

YEARLY TOTALS

1955.... 326,733,012 1954.... 313,741,265

U. S. Bureau of the Census.

Steel Barrels, Drums, and Pails

Shipments for Sale—Thousands of Units

1958	Heavy Type	Light Type	Grease Drums	Pails
9 Mo.	14,461	5,355	2,342	54,725
Jan.	1,625	556	221	5,271
Feb.	1,484	457	208	4,464
Mar.	1,551	512	245	5,283
Apr.	1,556	567	258	5,976
May	1,670	635	262	6,735
June	1,602	636	282	6,653
July	1,549	649	302	6,526
Aug.	1,588	659	258	6,293
Sept.	1,836	684	306	7,524
Oct.	....	....	....	....
Nov.	....	....	....	....
Dec.	....	....	....	....
1957	21,970	8,009	3,148	71,574
Jan.	1,983	663	258	5,817
Feb.	1,875	601	247	5,301
Mar.	2,008	607	268	5,999
Apr.	1,972	647	271	6,361
May	2,024	692	276	6,870
June	1,968	705	255	6,787
July	1,852	721	290	6,943
Aug.	1,839	727	281	6,456
Sept.	1,632	702	275	5,770
Oct.	1,833	742	302	6,168
Nov.	1,530	653	229	4,788
Dec.	1,454	549	196	4,314
1956	23,012	8,863	3,210	79,296
1955	22 044	8,806	n.a.	74,901
1954	19,117	7,304	n.a.	67,062

n.a.=not available.
U. S. Bureau of the Census.

Prices

METALWORKING FACTS AND FIGURES

1958 WEEKLY INDEX OF FINISHED STEEL PRICES

U. S. Bureau of Labor Statistics—1947-49=100

Week Ended	Index	Week Ended	Index	Week Ended	Index	Week Ended	Index
Jan. 7	181.7	Apr. 1	181.6	July 1	181.5	Oct. 7	186.7
Jan. 14	181.7	Apr. 8	181.6	July 8	181.5	Oct. 14	186.7
Jan. 21	181.7	Apr. 15	181.6	July 15	181.5	Oct. 21	186.7
Jan. 28	181.7	Apr. 22	181.6	July 22	181.5	Oct. 28	186.7
Jan. Avg.	181.7	Apr. 29	181.6	July 29	181.5	Oct. Avg.	186.7
		Apr. Avg.	181.6	July Avg.	181.5		
Feb. 4	181.8	May 6	181.6	Aug. 5	185.1	Nov. 4	187.3
Feb. 11	181.8	May 13	181.6	Aug. 12	186.3	Nov. 11	187.4
Feb. 18	181.7	May 20	181.6	Aug. 19	186.5	Nov. 18	187.4
Feb. 25	181.7	May 27	181.6	Aug. 26	186.5	Nov. 25	187.4
Feb. Avg.	181.8	May Avg.	181.6	Aug. Avg.	186.3	Nov. Avg.	187.4
Mar. 4	181.7	June 3	181.6	Sept. 2	186.5	Dec. 2	187.4
Mar. 11	181.6	June 10	181.5	Sept. 9	186.6	Dec. 9	187.4
Mar. 18	181.6	June 17	181.5	Sept. 16	186.6	Dec. 16	....
Mar. 25	181.6	June 24	181.5	Sept. 23	186.6	Dec. 23	....
Mar. Avg.	181.6	June Avg.	181.5	Sept. 30	186.6	Dec. 30	....
				Sept. Avg.	186.6	Dec.† Avg.	187.4

†Preliminary.

Beehive Metallurgical Coke

Average price—net ton

	1958	1957	1956	1955
Connellsville, furnace	$15.25	$15.22	$14.35	$13.70
Connellsville, foundry	18.25	18.12	16.97	16.65

Oven Foundry Coke

Average price—net ton

Ovens	1958	1957	1956	1955
Kearny, N. J.	$29.75	$29.77	$27.55	$24.77
Milwaukee	30.50	30.50	28.33	25.69

Lake Superior Iron Ore

(Per gross ton; 51.50% iron)

	1958	1957	1956	1955
Bessemer Old Range	$11.85	$11.85	$11.25	$10.40
Bessemer Mesabi	11.60	11.60	11.00	10.25
Nonbessemer Old Range	11.70	11.70	11.10	10.25
Nonbessemer Mesabi	11.45	11.45	10.85	10.10
High phosphorus	11.45	11.45	10.85	10.00

FINISHED STEEL—WEIGHTED PRICE COMPOSITE

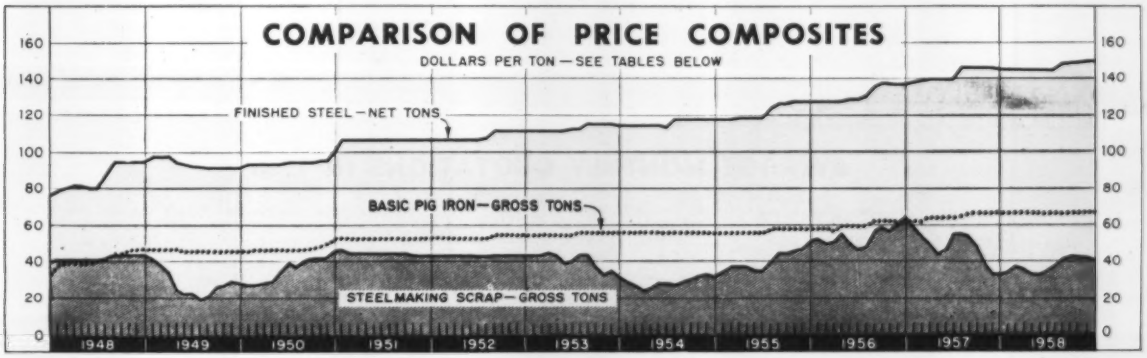
(Based on average shipments and prices during five-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold rolled sheets, galvanized sheets, hot and cold rolled strip)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958..	239.15	239.15	239.15	239.15	239.15	239.15	239.15	246.33	246.65	246.65	247.82	247.82	242.44
1957..	225.92	226.81	227.41	227.41	228.59	228.59	237.04	239.15	239.15	239.15	239.15	239.15	233.13
1956..	209.10	209.10	209.10	209.10	210.45	210.45	210.45	221.90	225.71	225.58	225.92	225.92	216.06
1955..	194.53	194.53	194.53	194.53	194.53	194.53	207.59	207.56	207.56	208.90	208.90	208.90	201.38
1954..	189.74	189.74	189.74	189.74	189.74	189.75	194.19	194.19	194.19	194.53	194.53	194.53	192.05
1953..	181.31	181.31	181.31	181.31	182.24	186.06	189.35	189.38	189.80	189.91	189.91	189.74	185.97
1952..	171.92	171.92	171.92	171.92	171.92	171.92	173.83	181.31	181.31	181.31	181.31	181.31	175.99
1951..	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92
1950..	156.13	156.13	156.13	156.13	156.13	156.54	156.69	156.95	156.99	157.53	157.76	167.87	157.57
1949..	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.75	153.53
1948..	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947..	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946..	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945..	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16

FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin	BARS				Basic	Standard
	H.R.	C.R.	Galv.	H.R.	C.R.	Plate	H.R.	C.F.	Plates	Shapes	Wire	Nails
1958	$99.96	$122.88	$134.29	$99.96	$145.29	$207.17	$110.58	$148.92	$103.60	$107.30	$155.92	$179.00
1957	95.92	117.90	128.90	95.92	139.90	203.67	104.88	141.35	99.42	103.26	148.35	174.25
1956	89.27	109.86	120.56	89.27	129.75	194.67	96.35	129.95	92.77	95.17	136.75	157.19
1955	83.75	102.75	113.00	83.75	120.12	183.00	89.50	113.00	87.25	88.50	120.00	144.50
1954	79.75	97.25	107.25	79.75	112.00	179.50	84.50	106.00	83.25	83.50	112.75	134.00
1953	77.60	93.70	103.70	85.34	111.25	179.00	81.20	101.52	80.20	79.75	108.26	129.08
1952	74.52	88.95	98.38	79.51	104.39	176.17	76.17	94.25	75.73	74.73	101.88	123.03
1951	73.00	87.00	96.00	77.60	101.60	174.00	74.00	91.00	74.00	73.00	98.60	120.00
1950	67.50	82.42	88.67	68.33	86.29	150.00	69.42	83.29	70.33	68.42	91.13	107.67
1949	65.22	80.08	88.00	67.75	84.33	155.00	67.55	80.04	68.75	65.24	84.05	105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83



FINISHED STEEL—ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958.....	$145.42	$145.42	$145.42	$145.42	$145.42	$145.42	$145.42	$148.55	$149.28	$149.28	$149.96	$149.96	$147.08
1957.....	138.60	139.38	139.71	139.71	140.24	140.24	146.10	146.19	146.19	146.03	146.03	145.66	142.84
1956.....	128.02	128.02	128.02	128.02	128.98	128.98	130.85	136.28	137.75	137.48	137.66	137.79	132.32
1955.....	117.82	117.82	118.40	118.45	118.45	118.45	124.59	127.41	127.41	128.14	128.14	127.75	122.74
1954.....	113.91	113.91	113.75	113.70	113.70	113.20	117.52	117.74	117.77	117.95	117.95	117.95	115.75
1953.....	110.98	110.98	110.98	110.98	111.13	112.49	112.51	115.56	115.56	115.42	115.18	114.41	113.02
1952.....	106.32	106.32	106.32	106.32	106.32	106.32	107.25	110.98	110.98	110.98	110.98	110.98	108.34
1951.....	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32
1950.....	92.92	93.09	93.18	93.19	93.65	94.35	94.36	94.44	94.50	94.91	95.09	100.76	94.54
1949.....	97.75	97.77	97.17	94.18	93.36	92.06	91.82	91.62	91.55	91.62	91.64	91.89	93.54
1948.....	78.26	79.16	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947.....	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago, eastern Pennsylvania. December and 1958 averages are estimated.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958.....	$34.10	$37.33	$35.83	$33.08	$33.21	$35.50	$37.54	$41.58	$42.87	$42.25	$41.42	$39.17	$37.82
1957.....	58.96	53.41	49.63	43.57	45.75	54.89	54.67	53.33	47.73	37.37	33.17	32.77	47.10
1956.....	52.17	48.96	50.21	54.90	50.34	46.04	47.70	57.13	59.08	57.27	61.83	64.29	54.16
1955.....	34.95	36.79	37.50	36.73	34.87	35.44	39.67	43.97	44.42	45.17	46.08	50.37	40.50
1954.....	29.05	26.91	24.37	25.67	28.00	27.92	27.42	28.80	29.94	32.25	33.33	32.58	28.85
1953.....	43.00	43.00	44.05	42.88	39.17	40.50	43.51	43.40	36.93	32.75	35.00	32.10	39.69
1952.....	43.00	43.00	43.00	43.00	43.00	42.63	42.60	43.00	43.00	43.00	43.00	43.00	42.94
1951.....	46.33	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	43.60	43.00	43.00	43.99
1950.....	26.93	27.52	28.23	29.40	33.82	39.25	37.04	40.00	40.93	41.37	41.33	45.50	35.94
1949.....	41.54	38.48	34.60	24.06	22.29	20.85	19.21	20.86	26.07	26.71	28.96	28.03	27.64
1948.....	40.75	40.48	40.21	40.41	40.67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947.....	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Pa., Birmingham, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Ill., Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958.....	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99	$65.99
1957.....	62.18	62.18	64.17	64.24	64.24	64.24	65.29	65.99	65.99	65.99	65.99	65.99	64.71
1956.....	58.49	58.49	56.63	59.80	59.80	59.80	59.93	62.18	62.18	62.18	62.18	62.18	60.32
1955.....	56.04	56.04	56.04	56.04	56.04	56.04	57.88	58.49	58.49	58.49	58.49	58.49	57.29
1954.....	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04
1953.....	54.66	54.66	54.66	54.66	54.66	54.63	56.03	56.04	56.04	56.04	56.04	56.04	55.35
1952.....	52.16	52.16	52.16	52.16	52.16	52.16	52.66	54.66	54.66	54.66	54.66	54.66	53.24
1951.....	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16
1950.....	45.70	45.97	45.97	45.97	45.97	45.97	45.97	45.97	47.08	47.98	49.04	52.16	46.98
1949.....	46.26	46.22	46.22	46.16	45.66	45.60	45.60	45.60	45.60	45.60	45.60	45.60	45.81
1948.....	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12

MALLEABLE PIG IRON PRICE COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Pa., Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Ill., Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958.....	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27	$67.27
1957.....	63.41	63.41	65.70	65.77	65.77	65.77	66.66	67.27	67.27	67.27	67.27	67.27	66.07
1956.....	59.77	59.77	59.93	61.27	61.27	61.27	61.52	63.41	63.41	63.41	63.41	63.41	61.82
1955.....	57.27	57.27	57.27	57.27	57.27	57.27	59.15	59.77	59.77	59.77	59.77	59.77	58.47
1954.....	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27
1953.....	55.77	55.77	55.77	55.77	55.77	55.77	57.27	57.27	57.27	57.27	57.27	57.27	56.52
1952.....	53.27	53.27	53.27	53.27	53.27	53.27	53.77	55.77	55.77	55.77	55.77	55.77	54.35
1951.....	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27
1950.....	47.27	47.27	47.27	47.27	47.27	47.27	47.33	47.49	48.15	49.46	50.27	53.27	48.30
1949.....	47.39	47.34	47.34	47.31	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.30
1948.....	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12

No. 2 FOUNDRY PIG IRON PRICE COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Pa., Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Pa., Granite City, Ill.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1958.....	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49	$66.49
1957.....	62.63	62.63	64.63	64.70	64.70	64.70	65.77	66.49	66.49	66.49	66.49	66.49	65.18
1956.....	58.99	58.99	59.15	60.27	60.27	60.27	60.95	62.63	62.63	62.63	62.63	62.63	61.00
1955.....	56.54	56.54	56.54	56.54	56.54	56.54	58.38	58.99	58.99	58.99	58.99	58.99	57.71
1954.....	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54
1953.....	55.04	55.04	55.04	55.04	55.04	55.04	56.54	56.54	56.54	56.54	56.54	56.54	55.79
1952.....	52.54	52.54	52.54	52.54	52.54	52.54	53.04	55.04	55.04	55.04	55.04	55.04	53.62
1951.....	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54
1950.....	46.20	46.47	46.47	46.47	46.47	46.47	46.57	46.85	47.55	49.20	49.54	52.54	47.57
1949.....	47.39	47.34	47.34	47.31	47.27	47.27	46.08	46.10	46.10	46.10	46.10	46.10	46.28
1948.....	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947.....	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1958

Unless otherwise noted, finished steel prices are cents per pound; semifinished steel, coke, and ammonium sulfate are dollars per net ton; other coal chemicals are in cents per unit stated; and pig iron and scrap in dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures are subject to revision.

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.455	5.50	5.50	5.50	5.50
Plates	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.26	5.30	5.30	5.30	5.30
Bars, Hot Rolled, Merchant Quality	5.425	5.425	5.425	5.425	5.425	5.425	5.425	5.675	5.675	5.675	5.675	5.675
Bars, Cold Finished	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.65	7.65	7.65	7.65	7.65
Sheets, Hot Rolled	4.925	4.925	4.925	4.925	4.925	4.925	4.925	5.10	5.10	5.10	5.10	5.10
Sheets, Cold Rolled	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.275	6.275	6.275	6.275	6.275
Sheets, Galvanized	6.60	6.60	6.60	6.60	6.60	6.60	6.60	6.875	6.875	6.875	6.875	6.875
Strip, Hot Rolled	4.925	4.925	4.925	4.925	4.925	4.925	4.925	5.10	5.10	5.10	5.10	5.10
Strip, Cold Rolled	7.15	7.15	7.15	7.15	7.15	7.15	7.15	7.425	7.425	7.425	7.425	7.425
Standard Spikes	9.75	9.75	9.75	9.75	9.75	9.75	9.75	10.03	10.10	10.10	10.10	10.10
Plain Wire	7.65	7.65	7.65	7.65	7.65	7.65	7.65	8.00	8.00	8.00	8.00	8.00
Wire Nails	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Structural Rivets	12.25	12.25	12.25	12.25	12.25	12.25	12.25	12.25	12.85	12.85	12.85	12.85
Steel Pipe, Buttweld, 1-3 in.; % discount from list	14.25	14.25	14.25	14.25	14.25	14.25	14.25	11.25	11.25	11.25	11.25	11.25
Tin Plate, 1.50-lb coating (base box)	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.65	$10.65
Pig Iron, bessemer, Pittsburgh district ovens	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00
Pig Iron, Basic, Pittsburgh district ovens	66.00	66.00	66.00	66.00	66.00	66.00	66.00	66.00	66.00	66.00	66.00	66.00
Pig Iron, No. 2 Foundry, Neville Island, Pa.	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50
Pig Iron, Malleable, Neville Island, Pa.	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, Ohio, furnace	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00
Billets, Bessemer, and Open Hearth, Rerolling	77.50	77.50	77.50	77.50	77.50	77.50	77.50	80.00	80.00	80.00	80.00	80.00
Wire Rods (cents per pound)	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.40	6.40	6.40	6.40	6.40
Coke, Furnace, Beehive, spot, Connellsville, Pa.	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25
Coke, Foundry, Beehive, spot, Connellsville, Pa.	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
Scrap, No. 1 Heavy Melting Steel	32.75	35.00	35.50	32.75	32.50	35.70	37.50	43.00	43.10	43.50	42.50	42.50
Scrap, Low Phos. (Punchings and Plate)	36.00	39.50	40.10	37.50	37.75	40.10	41.50	49.50	49.30	47.75	49.50	49.50
Scrap, No. 1 Cupola	38.75	40.00	40.50	42.75	40.50	40.10	40.00	43.50	43.50	44.25	44.50	44.50

CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Hot Rolled, Merchant Quality	5.425	5.425	5.425	5.425	5.425	5.425	5.425	5.675	5.675	5.675	5.675	5.675
Plates	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.26	5.30	5.30	5.30	5.30
Structural Shapes	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.455	5.50	5.50	5.50	5.50
Bars, Merchant, Rail Steel	5.425	5.425	5.425	5.425	5.425	5.425	5.425	5.675	5.675	5.675	5.675	5.675
Sheets, Cold Rolled	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.275	6.275	6.275	6.275	6.275
Pig Iron, No. 2 Foundry	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50	$66.50
Pig Iron, Malleable	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50	66.50
Oven Foundry Coke, delivered from St. Paul	33.24	33.27	33.29	33.29	33.29	33.29	33.29	33.20	33.18	33.18	33.18	33.18
Scrap, No. 1 Heavy Melting Steel	32.00	38.50	33.50	30.13	32.63	36.60	40.13	43.50	45.10	42.25	42.50	42.50
Scrap, Rails for Rerolling	50.75	55.00	54.70	51.88	51.13	54.20	59.00	64.50	65.10	62.50	62.25	62.50
Scrap, No. 1 Cupola Cast	38.00	38.00	40.00	39.00	38.00	38.00	38.25	40.00	40.20	45.00	45.50	45.50

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Plates, Sparrows Point, Md.	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.22	5.30	5.30	5.30	5.30
Structural Shapes, deld. Philadelphia	5.545	5.545	5.545	5.545	5.545	5.545	5.545	5.725	5.77	5.77	5.77	5.77
Steel Bars, deld. Philadelphia	5.725	5.725	5.725	5.725	5.725	5.725	5.725	5.975	5.975	5.975	5.975	5.975
Sheets, Hot Rolled, Sparrows Point, Md.	4.925	4.925	4.925	4.925	4.925	4.925	5.925	5.10	5.10	5.10	5.10	5.10
Pig Iron, Basic, deld. Philadelphia	$70.01	$70.21	$70.41	$70.41	$70.41	$70.41	$70.41	$70.41	$70.41	$70.41	$70.41	$70.41
Pig Iron, No. 2 Foundry, deld. Philadelphia	70.51	70.71	70.91	70.91	70.91	70.91	70.91	70.91	70.91	70.91	70.91	70.91
Pig Iron, Standard Low Phos, deld. Philadelphia	82.27	82.47	82.67	82.67	82.67	82.67	82.67	82.17	81.67	81.67	81.67	81.67
Oven Foundry Coke, Kearny, N. J.	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75
Scrap, No. 1 Heavy Melting Steel	37.56	38.50	38.50	36.38	34.50	34.20	35.00	38.25	40.50	41.00	38.25	36.00
Scrap, No. 1 Cupola Cast	38.00	38.00	40.00	39.00	38.00	38.00	38.25	40.00	40.20	41.00	41.00	41.00
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzene, per gallon, producers' plants, tank lots	36.00	36.00	36.00	36.00	36.00	36.00	32.00	31.00	31.00	31.00	31.00	31.00
Toluene, 1 degree, per gallon, producers' plants	29.50	29.50	29.50	26.20	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Xylene, per gallon, producers' plants, tank lots	33.00	33.00	33.00	33.00	33.00	33.00	33.00	30.60	29.00	29.00	29.00	29.00
Phenol, Grade 5, per pound, producers' plants	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
Ammonium Sulfate, per ton, bulk, ovens	33.00	33.00	33.00	33.00	33.00	33.00	33.50	33.50	33.50	33.50	33.50	33.50

Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	1958												Yearly Averages		
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	1958*	1957	1956
Copper Sheets[1]	48.63	48.13	48.13	48.13	48.13	48.13	49.26	49.63	49.63	50.53	52.26	53.13	49.48	52.51	63.52
Copper Rods[7]	45.86	45.36	45.36	45.36	45.36	45.36	46.49	46.86	46.86	47.76	49.49	50.36	46.71	49.74	60.68
Copper Tubing[1]	48.82	48.32	48.32	48.32	48.32	48.32	49.45	49.82	49.82	50.73	52.52	53.39	49.68	52.70	63.64
Yellow Brass Sheets[1]	43.03	42.69	42.69	42.69	42.69	42.69	43.35	43.57	43.57	44.37	45.70	46.57	43.63	45.83	53.22
Yellow Brass Rods[1]	31.35	31.03	31.03	31.03	29.91	29.53	30.10	29.28	29.28	29.28	30.35	31.22	30.28	34.72	43.50
Yellow Brass Tubing[1]	45.93	45.60	45.60	45.60	45.60	45.60	46.26	46.48	46.48	47.28	48.67	49.98	46.59	48.74	56.12
Nickel Silver Sheets[3]	58.56	57.93	57.93	57.93	57.93	57.93	58.60	58.82	58.82	59.56	60.89	62.20	58.93	62.37	68.01
Phosphor Bronze Sheets[4]	67.65	67.17	67.17	67.17	67.17	67.17	68.24	68.59	68.59	69.52	71.28	72.59	68.53	71.53	81.60
Zinc Sheets[1]	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	26.00	24.17	24.00	23.86
Bronze Sheets[2]	47.43	46.98	46.98	46.98	46.98	46.98	47.94	48.30	48.30	49.17	50.78	51.65	48.21	50.99	60.71
Bronze Rods[2]	47.37	46.92	46.92	46.92	46.92	46.92	47.91	48.24	48.24	49.11	50.72	51.59	48.15	50.93	60.65
Bronze Tubing[2]	49.99	49.54	49.54	49.54	49.54	49.54	50.53	50.86	50.86	51.73	53.40	54.71	50.82	53.55	63.19
Yellow Brass Wire[1]	43.56	43.23	43.23	43.23	43.23	43.23	43.89	44.11	44.11	44.91	46.24	47.11	44.17	46.37	53.75
Weatherproof Copper Wire[5]	32.81	32.53	32.53	32.53	32.53	32.53	33.10	33.66	33.66	34.34	35.54	35.54	33.44	36.32	45.35
Bare Copper Wire[5]	30.855	30.355	30.355	30.355	30.355	30.355	31.105	31.855	31.855	32.754	34.35	34.35	31.575	35.568	47.48
No. 115 Brass Ingots[6]	26.38	25.75	24.95	25.25	25.25	26.80	27.00	27.00	27.00	28.40	28.75	28.00	26.71	29.90	38.68
No. 305 Brass Ingots[6]	30.38	29.75	28.95	29.25	29.25	31.05	31.25	31.25	31.25	32.65	33.00	32.25	30.86	33.71	42.19
No. 405 Brass Ingots[6]	21.88	21.25	20.45	20.75	20.75	22.55	22.75	22.75	22.75	23.65	23.75	23.00	22.19	24.27	30.93

*Estimated.
[1]F.o.b. mill. [2]90% Cu, f.o.b. mill. [3]10% Ni, f.o.b. mill. [4]Grade A, f.o.b. mill. [5]Car lots, f.o.b. eastern mill. [6]Delivered. [7]Cold-drawn, f.o.b. mill.

COPPER

Electrolytic; cents per lb, delivered Connecticut Valley

	1958	1957	1956	Yearly Averages
Jan.	25.135	35.433	46.700	1958*..26.087
Feb.	24.298	32.563	48.076	1957..29.611
Mar.	24.163	31.462	49.727	1956..42.446
Apr.	24.323	31.598	47.500	1955..38.217
May	24.433	31.087	45.096	1954..29.777
June	25.400	30.250	43.000	1953..29.037
July	26.125	28.822	40.030	1952..24.500
Aug.	26.510	28.639	39.750	1951..24.500
Sept.	26.428	26.469	39.500	1950..21.588
Oct.	28.058	26.361	38.365	1949..19.499
Nov.	29.415	26.217	35.956	1948..22.317
Dec.	28.750	26.130	35.650	1947..21.215

ZINC

Prime western; cents per lb, East St. Louis, Ill.

	1958	1957	1956	Yearly Averages
Jan.	10.000	13.500	13.440	1958*..10.313
Feb.	10.000	13.500	13.500	1957..11.397
Mar.	10.000	13.500	13.500	1956..13.495
Apr.	10.000	13.500	13.500	1955..12.303
May	10.000	11.923	13.500	1954..10.721
June	10.000	10.840	13.500	1953..10.851
July	10.000	10.000	13.500	1952..16.213
Aug.	10.000	10.000	13.500	1951..17.994
Sept.	10.000	10.000	13.500	1950..13.879
Oct.	10.865	10.000	13.500	1949..12.152
Nov.	11.386	10.000	13.500	1948..13.563
Dec.	11.500*	10.000	13.500	1947..10.500

MAGNESIUM

99.8% primary pig, cents per lb, f.o.b. Velasco, Tex.

	1958	1957	1956	1955	1954
Jan.	35.250	35.250	32.500	27.000	27.000
Feb.	35.250	35.250	32.500	27.000	27.000
Mar.	35.250	35.250	32.500	27.556	27.000
Apr.	35.250	35.250	33.150	28.500	27.000
May	35.250	35.250	33.750	28.500	27.000
June	35.250	35.250	33.750	28.500	27.000
July	35.250	35.250	33.750	28.500	27.000
Aug.	35.250	35.250	34.694	30.574	27.000
Sept.	35.250	35.250	35.250	32.500	27.000
Oct.	35.250	35.250	35.250	32.500	27.000
Nov.	35.250	35.250	35.250	32.500	27.000
Dec.	35.250*	35.250	35.250	32.500	27.000
Avg	35.250*	35.250	33.966	29.678	27.000

ANTIMONY

Domestic, bulk, 99.5% car lots; cents per lb, f.o.b. Laredo, Tex.

	1958	1957	1956	Yearly Averages
Jan.	33.000	33.000	33.000	1958*..29.438
Feb.	30.250	33.000	33.000	1957..33.000
Mar.	29.000	33.000	33.000	1956..33.000
Apr.	29.000	33.000	33.000	1955..30.150
May	29.000	33.000	33.000	1954..28.500
June	29.000	33.000	33.000	1953..33.932
July	29.000	33.000	33.000	1952..42.112
Aug.	29.000	33.000	33.000	1951..42.335
Sept.	29.000	33.000	33.000	1950..27.626
Oct.	29.000	33.000	33.000	1949..36.875
Nov.	29.000	33.000	33.000	1948..35.010
Dec.	29.000*	33.000	33.000	1947..31.922

*Estimated.

ALUMINUM

99.5% primary pig; cents per lb, f.o.b. shipping point

	1958	1957	1956	Yearly Averages
Jan.	26.00	25.00	22.50	1958*..24.79
Feb.	26.00	25.00	22.50	1957..25.42
Mar.	26.00	25.00	22.64	1956..24.03
Apr.	24.00	25.00	24.00	1955..21.88
May	24.00	25.00	24.00	1954..20.20
June	24.00	25.00	24.00	1953..19.70
July	24.00	25.00	24.00	1952..18.40
Aug.	24.70	26.00	24.70	1951..18.00
Sept.	24.70	26.00	25.00	1950..16.70
Oct.	24.70	26.00	25.00	1949..16.00
Nov.	24.70	26.00	25.00	1948..14.73
Dec.	24.70*	26.00	25.00	1947..14.00

LEAD

Common grade; cents per lb, St. Louis

	1958	1957	1956	Yearly Averages
Jan.	12.800	15.800	15.960	1958*..11.917
Feb.	12.800	15.800	15.800	1957..14.459
Mar.	12.800	15.800	15.800	1956..15.813
Apr.	11.800	15.800	15.800	1955..14.940
May	11.512	15.185	15.800	1954..13.854
June	11.040	14.120	15.800	1953..13.283
July	10.800	13.800	15.800	1952..16.268
Aug.	10.646	13.800	15.800	1951..17.294
Sept.	10.730	13.800	15.800	1950..13.095
Oct.	12.473	13.504	15.800	1949..15.191
Nov.	12.800	13.300	15.800	1948..17.867
Dec.	12.800*	12.800	15.800	1947..14.504

COBALT

97-99%; dollars per lb for 550-lb keg

	1958	1957	1956	1955	1954	1953
Jan.	2.00	2.54	2.60	2.60	2.60	2.40
Feb.	2.00	2.35	2.60	2.60	2.60	2.40
Mar.	2.00	2.35	2.60	2.60	2.60	2.40
Apr.	2.00	2.35	2.60	2.60	2.60	2.40
May	2.00	2.26	2.60	2.60	2.60	2.40
June	2.00	2.00	2.60	2.60	2.60	2.40
July	2.00	2.00	2.60	2.60	2.60	2.40
Aug.	2.00	2.00	2.60	2.60	2.60	2.40
Sept.	2.00	2.00	2.60	2.60	2.60	2.40
Oct.	2.00	2.00	2.60	2.60	2.60	2.40
Nov.	2.00	2.00	2.60	2.60	2.60	2.60
Dec.	2.00*	2.00	2.60	2.60	2.60	2.60
Avg	2.00*	2.15	2.60	2.60	2.60	2.43

SILVER

Open market, cents per fine ounce, New York

	1958	1957	1956	Yearly Averages
Jan.	89.438	91.375	90.381	1958*..89.047
Feb.	88.625	91.375	91.043	1957..90.846
Mar.	88.625	91.375	91.148	1956..90.839
Apr.	88.625	91.375	90.880	1955..89.062
May	88.625	91.375	90.750	1954..85.250
June	88.625	90.500	90.461	1953†..85.188
July	88.625	90.250	90.135	1952†..84.941
Aug.	88.625	90.938	90.588	1951†..89.368
Sept.	88.625	90.625	90.750	1950†..74.165
Oct.	89.875	90.625	91.178	1949†..71.930
Nov.	90.125	90.344	91.375	1948†..74.361
Dec.	90.125*	90.000	91.375	1947†..71.820

*Estimated.
†As reported by Handy & Harman, New York.

NICKEL

Electrolytic cathodes, 99.5%, base sizes, unpacked, cents per lb, f.o.b. refinery

	1958	1957	1956	Yearly Averages
Jan.	74.000	74.000	64.500	1958*..74.000
Feb.	74.000	74.000	64.500	1957..74.000
Mar.	74.000	74.000	64.500	1956..65.032
Apr.	74.000	74.000	64.500	1955..64.500
May	74.000	74.000	64.500	1954..60.450
June	74.000	74.000	64.500	1953..59.888
July	74.000	74.000	64.500	1952..56.500
Aug.	74.000	74.000	64.500	1951..54.000
Sept.	74.000	74.000	64.500	1950..44.809
Oct.	74.000	74.000	64.500	1949..40.000
Nov.	74.000	74.000	64.500	1948..36.528
Dec.	74.000*	74.000	70.880	1947..35.000

TIN

Straits, spot; cents per lb, New York

	1958	1957	1956	Yearly Averages
Jan.	92.933	101.480	105.067	1958*..95.105
Feb.	93.818	101.159	100.908	1957..96.317
Mar.	93.425	99.683	100.606	1956..101.517
Apr.	93.021	99.276	99.270	1955..94.939
May	94.510	98.341	97.024	1954..91.936
June	94.701	98.080	94.611	1953..95.925
July	94.950	96.576	96.435	1952..120.492
Aug.	94.995	94.259	99.043	1951..127.072
Sept.	94.120	93.422	103.745	1950..95.552
Oct.	96.500	91.843	105.981	1949..99.996
Nov.	99.034	89.288	111.049	1948..99.250
Dec.	99.250	92.395	104.465	1947..77.975

IRIDIUM

Dollars per troy ounce

	1958	1957	1956	1955	1954
Jan.	87.50	100.00	110.00	115.00	170.00
Feb.	80.00	105.00	106.25	121.50	170.00
Mar.	80.00	105.00	105.00	105.00	156.50
Apr.	80.00	105.00	105.00	105.00	147.50
May	76.25	105.00	105.00	103.00	147.50
June	75.00	103.75	105.00	95.00	147.50
July	75.00	100.00	105.00	95.00	147.50
Aug.	75.00	105.00	100.00	97.00	147.50
Sept.	75.00	99.40	100.00	100.00	147.50
Oct.	75.00	98.00	100.00	102.00	147.50
Nov.	75.00	95.75	100.00	110.00	147.50
Dec.	75.00*	95.00	104.00	110.00	123.12
Avg	77.40*	101.40	103.77	104.88	149.97

PLATINUM

Dollars per ounce

	1958	1957	1956	1955	1954	1953
Jan.	78.00	102.00	106.50	82.13	92.00	91.50
Feb.	75.25	98.75	104.50	81.00	92.00	91.50
Mar.	72.70	93.50	104.00	78.00	87.90	91.50
Apr.	71.13	93.50	103.90	78.00	85.50	91.50
May	67.75	93.13	105.75	77.90	85.50	91.50
June	66.40	92.25	106.50	78.13	85.50	91.50
July	64.75	90.70	106.50	81.38	85.50	93.00
Aug.	63.50	84.75	106.50	83.50	83.50	92.00
Sept.	62.25	84.00	106.00	90.63	85.50	92.00
Oct.	58.50	84.00	105.50	94.30	85.50	92.00
Nov.	57.25	84.00	105.50	102.75	85.50	92.00
Dec.	53.50*	78.50	104.60	107.00	101.00	92.00
Avg	67.582	89.92	105.48	86.23	86.60	91.83

*Estimated.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

COPPER PRODUCTION, SHIPMENTS & STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries to Customers	Refined Stocks End of Period
1958					
10 Mo..	814,086	106,477	1,171,514	932,867	128,490
Jan. ..	94,735	13,855	136 748	110.757	176,287
Feb. ..	87,130	6,222	128 299	94,446	201,223
Mar. ..	90,336	8,607	130,075	79,046	238,641
Apr. ..	86,123	11,475	120 467	81,930	251,699
May ..	80,628	10,488	115,978	78,631	253,463
June ..	71,092	10,980	107 918	100,796	245,450
July ..	64,444	8,858	110.130	77,523	242,781
Aug. ..	67,917	8,999	100 640	86,982	215,560
Sept. ..	79,541	7,259	107,971	101,064	178,222
Oct. ..	92,140	19,734	113.288	121,692	128,490
1957	1,116,380	112,060	1,616 964	1,277,946	181,024
1956	1,133,134	139,584	1,580,387	1,465,999(a)	120 645
1955	1,036 702	124,760	1,467,448	1,446 354(a)	61.554
1954	863,721	102,472	1,311,031	1 208,755(a)	47,108
1953	957,318	110,475	1,395 003	1,443,719(a)	89,193
1952	961,886	46,003	1,189,112	1,445.834(a)	58,858
1951	964,589	56 910	1,199,784	1,367,787	71,528
1950	940,249	117,439	1,270,768	1,371,464	49,040
1949	772,986	135 052	1,056,463	1,031,595	116 027
1948	850,088	130,410	1,233,697	1,344,445	96,080

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries to Customers	Refined Stocks End of Period
1958					
10 Mo..	1,411,722	5,450	1,121,688	1,462,542	140.285
Jan. ..	156,329	462	125,105	149,121	272.613
Feb. ..	143,586	284	119,263	130.263	268 524
Mar. ..	157,606	365	129.082	150,895	254,685
Apr. ..	129.338	471	106 428	128,482	250,067
May ..	137,759	702	109,793	134,302	245,053
June ..	143,191	584	120,469	140,029	231,373
July ..	151 871	658	119,448	143,278	232,383
Aug. ..	156,756	475	117,274	160,882	220,168
Sept. ..	123,178	701	96,035	153,603	196,558
Oct. ..	112.108	748	78,791	171,687	140,285
1957	1,781,339	11,210	1,418,624	1,575,361	277 316
1956	1,729,705	12,952	1,406,773	1,366,979	233,775
1955	1,576,960	8,305	1,260 861	1,298,037	159,777
1954	1,494,386	5,273	1,155,516	1,247,120	181,529

Total Domestic & Foreign

1958					
10 Mo..	2,225,808	111,927	2,293,202	2,395,409	268,775
1957	2,897,719	123.270	3,035.588	2.853,307	458.340
1956	2,862,839	152,536	2,987 160	2,832,978	354.420
1955	2,613.662	133,065	2,728.309	2.744.391	221.331
1954	2,358,107	107,745	2,466,547	2,455,875	228,637

Copper Institute. (a)—Includes tonnages delivered from government stocks and by importers.

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1958	1957	1956	1955	1954	1953
Jan.	53.182	58,502	32,195	39 307	34.790	50 055
Feb.	47,603	43,088	48,674	46,082	55 868	62 345
Mar.	48,945	55,338	44 170	45,273	43 384	52,387
Apr.	52,627	58,292	47,881	44,027	45 975	70,191
May	31 698	48,377	52,416	45,340	51 989	67,662
June	58,900	40,963	52,992	49 368	81,833	80 943
July	33,705	54,303	49,324	46 581	62 228	66,200
Aug.	.....	47,899	58,091	55,089	55 391	48,305
Sept.	.....	42 390	47,882	63,663	54 436	57,379
Oct.	.....	54 741	63,686	72,500	30,805	50,810
Nov.	.....	46 650	41 652	57,114	43,540	32 226
Dec.	.....	47,720	60 226	58,050	46,755	32,105
Monthly Avg	.....	49,855	49,935	50,200	50,583	55,884

U. S. Bureau of the Census.

Exports of Copper

Refined, Scrap, Brass, and Bronze—Net Tons

	1958	1957	1956	1955	1954	1953
Jan.	30.265	43.298	18,554	26.929	30,472	8.079
Feb.	21.056	40.981	21.659	37.375	25.499	6.030
Mar.	27.539	57 151	21 686	25.673	19,043	8,645
Apr.	27,987	50 077	18 040	27,095	31,235	6.551
May	43.482	44,775	30,303	30 233	29 712	8,669
June	25,192	47,268	17,703	19.323	26 046	7,278
July	30.326	34,519	16,172	13,819	24,183	13 317
Aug.	43.851	28,135	24,047	15.399	27,121	18,064
Sept.	.....	29,965	27,556	22 294	16 783	18,249
Oct.	.....	25,103	29.312	20,405	25 867	18,870
Nov.	.....	35,689	25,165	19.340	18,883	15,898
Dec.	.....	28 421	49.408	19,142	23,562	20,416
Monthly Avg	.....	38,782	24,967	23,086	24,866	12,506

U. S. Bureau of the Census.

Brass Ingot Shipments

Net Tons

	1958	1957	1956	1955
Jan.	20,468	25 681	27,736	25,201
Feb.	17,413	20,769	24,949	25,349
Mar.	18,825	21,948	28,310	29,713
Apr.	18,009	23,507	25,808	27,641
May	17,191	22 037	23 437	23,708
June	17,962	18,888	18 842	23,141
July	16,658	16 695	17,364	18,513
Aug.	17,882	19,654	23,812	27,013
Sept.	20,540	19.670	20,929	26,349
Oct.	23,225	22,800	23 015	25,228
Nov.	.....	19,767	21,818	25,102
Dec.	.....	16,875	18,046	21,448
Totals	.....	248,291	274,096	298,406

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry.

Copper Consumption in U. S.

Refined Metal—Net Tons

	1957	1956	1955
Brass Mills	533,954	611,098	647,044
Wire Mills	773.632	864,585	812,663
Chemical Plants.	1,480	1,758	1,744
Secondary Smelters	7,876	7,654	6,827
Foundries	20,378	18,980	17,478
Miscellaneous ..	14,804	17,314	16,248
Totals	1,352,124	1,521,389	1,502,004

U. S. Bureau of Mines.

Copper & Brass Mill Fabricator Statistics

(They cover U. S., duty free, and duty paid foreign copper until January, 1947; from that date all sources are included. Figures are in net tons.)

	DELIVERIES: Deliveries to Users (actual consump.)	Producer Deliveries to Fabricators	STOCKS AT END OF PERIOD: Fabricators' Refined Stocks	Less Working Stocks	Visible Supplies	Plus Undelivered Purchases	Total Stocks and Purchases	Unfilled Orders
1958								
9 Mo.	824,912	811,650	416,587	319,281	97,306	77 025	174,331	145 390
Jan.	94,842	110,757	445,514	348,426	97,088	58,217	155,305	124,056
Feb.	87,287	94,446	452,673	351,035	101,638	52,718	154 356	128,706
Mar.	83,694	79,046	448,125	346,875	101,250	71,693	172,943	141,387
Apr.	79,613	81,930	450,442	347,607	102,735	76 602	179,337	145,623
May	88,447	78,631	441,001	346,404	94,597	78,194	172,791	138,190
June	109,010	100,796	433,526	330,301	103 325	72,385	175,610	145,162
July	79,353	77,523	431,796	326 263	105,533	77,362	182,895	153,529
Aug.	96,717	86,982	421,931	323,667	98,264	78 194	176,458	150 436
Sept.	105,949	101,539	416,587	319,281	97,306	77,025	174,331	145,390
1957	1,282,329	1,277,946	430,171	347,465	82,706	75,627	158,333	138,631
Jan.	119,517	119,925	435,635	335,944	99,691	107,231	206,922	178,326
Feb.	114 298	101,565	422,266	334,542	87,724	110 174	197,898	178 913
Mar.	106,170	113,571	429,410	338,454	90,956	104,551	195,507	164,623
Apr.	117,141	116,816	429,708	335,921	93,787	98,638	192 425	164,410
May	116,120	121,101	434,852	336,697	98,155	92,943	191,098	170,476
June	113 013	102,479	426,905	340,743	86,162	82 919	169,081	153 042
July	78,418	85,129	432,918	341,684	91,234	85,728	176,962	144,410
Aug.	110,423	107,622	429,627	344,315	85 312	82,768	168 080	144,375
Sept.	107,720	103,718	425,168	344,530	80,638	80,436	161,074	144,538
Oct.	118,990	114,032	420,130	341,869	78,261	80,774	159,035	138,420
Nov.	99,452	107,542	428,520	345,832	82,688	68,249	150,937	128,719
Dec.	83,067	84,446	430,171	347,465	82,706	75,627	158.333	138,631
1956	1,416,378	1,465,999	437,187	336,217	100,970	117,601	218,571	183,834
1955	1,418,241	1,446 354	389,974	314.145	75,829	139,094	214,923	293,264
1954	1,231,840	1,208,755	360,526	304,619	55,907	58,125	114,032	136,581
1953	1,375,869	1,443,719	380,881	309,664	71 217	25,022	96,239	170,917
1952	1,391,477	1,445,834	331,499	292,157	39,342	32,652	71,994	275,608
1951	1,394,960	1,367,787	280,402	295,385	—14,983	32,147	17,164	303,050
1950	1,438,237	1,371,464	290,241	288,392	1,849	92,372	94,221	313,052
1949	1,053,225	1,031,595	354,992	285,298	69,694	82,793	152,487	189,407
1948	1,394,307	1,344,445	379,346	295,958	83.388	81,496	164,884	315,944
1947	1,338,383	1,383,666	423,432	293,859	129,573	103,765	233,338	338,260
1946	1,231,225	1,260,921	411,013	286 418	124,595	59,421	184,016	526,648
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362,436

Copper Institute.

Slab Zinc

(Net tons)

Commencing with January, 1948, all regularly operating U. S. primary and secondary smelters are included. Production from foreign ores is included, commencing with 1940.

	Stock Beginning	Production	SHIPMENTS Domestic	Export & Drawback	Gov't. Acc't.	Totals	Unfilled Orders at End
1958*	166,660	810,000	770,000	3,200	34,488	807,686	†
Jan.	166,660	82,343	58,211	641	9,805	68,657	†
Feb.	180,346	68,554	49,072	446	9,993	59,511	†
Mar.	189,189	72,274	48,948	111	8,763	57,822	†
Apr.	203,641	70,214	46,598	159	5,927	52,684	†
May	221,171	71,018	51,390	129	0	51,519	†
June	240,670	66,967	54,487	171	0	54,658	†
July	252,979	65,119	60,132	55	0	60,187	†
Aug.	257,911	62,927	68,718	591	0	69,309	†
Sept.	251,529	63,705	76,905	213	0	77,118	†
Oct.	238,116	65,304	93,018	226	0	93,244	†
Nov.	210,176	65,174	83,394	212	0	83,606	†
1957	68,622	1,057,450	765,132	14,970	179,446	959,568	18,217
1956	40,979	1,062,954	869,270	9,027	157,014	1,035,311	34,913
1955	124,277	1,031,018	1,007,619	19,496	87,200	1,114,316	72,908
1954	180,843	868,242	787,922	27,929	108,957	924,808	45,862
1953	87,160	971,191	818,850	16,326	42,332	877,508	35,466
1952	21,901	961,430	803,343	56,202	36,626	896,171	45,264
1951	8,884	931,833	836,800	42,067	39,949	918,816	50,909
1950	94,221	910,363	849,255	18,189	128,256	995,700	74,795
1949	20,848	870,113	648,285	56,929	91,526	796,740	42,625
1948	68,647	850,105	770,396	69,910	57,598	897,904	51,318
1947	175,500	848,027	698,281	117,305	140,230	955,816	59,705
1946	259,391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237,320	799,520	762,925	9,422	5,302	777,649	27,092
1944	173,510	901,332	830,334	6,988	.....	837,322	21,332
1943	89,275	971,873	831,430	56,208	.....	887,638	44,914
1942	24,066	929,770	733,918	151,650	.....	885,568	52,752
1941	17,582	863,955	751,276	106,195	.....	857,471	87,666
1940	74,262	706,100	674,615	88,165	.....	762,780	125,132
1939	126,769	538,198	598,972	.....	.....	598,972	53,751
1938	65,333	456,990	395,534	20	.....	395,554	40,829

American Zinc Institute Inc. *Estimated. †Monthly figures discontinued.

U. S. Lead

Refiners' Stocks, Production, Shipments

(Net tons)

	Stock at Beginning	Production (Inc. Secondary)	Total Supply	Domestic Shipments
1958*	91,598	528,000	619,598	405,000
Jan.	91,598	47,665	139,263	33,422
Feb.	101,206	47,133	148,339	23,532
Mar.	119,522	43,441	162,963	28,885
Apr.	128,734	40,984	169,738	22,172
May	143,136	47,487	190,623	30,021
June	155,121	44,636	199,757	32,078
July	163,501	38,827	202,331	31,948
Aug.	164,860	39,520	204,380	34,254
Sept.	169,332	43,269	212,571	41,657
Oct.	170,666	45,167	216,133	46,647
1957	41,181	604,353	645,534	463,060
1956	31,089	613,293	644,382	524,848
1955	92,719	547,153	639,872	531,339
1954	81,152	551,618	632,770	475,552
1953	43,560	533,883	577,443	488,437
1952	25,339	532,778	558,117	492,094
1951	35,619	486,874	522,493	496,184
1950	70,424	571,763	642,187	499,637
1949	38,644	542,676	581,320	355,965
1948	21,328	511,356	532,684	490,630
1947	47,587	541,065	588,652	566,666
1946	44,867	396,688	441,555	393,904
1945	19,536	524,328	543,864	500,003
1944	33,090	538,618	571,708	552,063
1943	34,937	546,673	581,610	548,417
1942	20,185	633,818	654,003	618,947
1941	40,926	634,888	675,814	655,542
1940	58,777	685,480	644,257	603,143
1939	115,902	497,991	613,893	555,074
1938	129,131	408,539	537,570	421,625
1937	171,856	533,215	705,071	575,933
1936	222,306	463,006	685,312	513,361

American Bureau of Metal Statistics. *Estimated.

Mine Production of Zinc

(Net tons)

	1958	1957	1956	1955	1954
Jan.	38,708	50,174	41,082	41,005	36,637
Feb.	33,545	46,080	42,703	40,101	39,398
Mar.	35,624	51,057	47,745	46,286	42,248
Apr.	39,405	51,714	44,971	43,721	39,915
May	35,831	47,123	47,286	45,351	40,008
June	32,971	45,490	45,141	43,972	40,391
July	28,769	42,672	43,152	41,854	38,445
Aug.	29,287	42,376	45,532	43,555	38,141
Sept.	29,865	31,779	42,513	43,080	34,178
Oct.	.....	39,350	49,600	42,700	35,511
Nov.	.....	34,967	46,170	41,083	38,338
Dec.	.....	34,346	46,445	41,963	39,035
Mo. Avg	43,344	45,195	42,889	38,770	

U. S. Bureau of Mines.

Mine Production of Lead

(Net tons)

	1958	1957	1956	1955	1954
Jan.	25,801	30,166	26,822	27,828	24,946
Feb.	23,632	28,987	28,250	27,427	27,624
Mar.	18,307	30,867	30,950	31,315	29,531
Apr.	25,664	31,658	29,705	28,686	26,900
May	24,225	30,091	29,975	28,932	25,404
June	22,776	27,271	29,481	28,427	26,253
July	21,135	27,231	27,969	25,783	25,364
Aug.	19,414	27,718	30,630	26,813	27,066
Sept.	19,123	24,902	27,415	26,876	25,001
Oct.	.....	28,414	31,520	27,564	25,755
Nov.	.....	23,308	28,503	25,975	26,911
Dec.	.....	22,880	27,109	27,802	28,230
Mo. Avg	27,791	29,402	28,169	26,499	

U. S. Bureau of Mines.

Titanium

(Domestic production—Net tons)

	Sponge		Mill Products
1958*	4,500	1958*	2,450
1957	17,249	1957	5,658
1956	14,595	1956	5,166
1955	7,398	1955	1,898
1954	5,370	1954	1,299
1953	2,241	1953	1,114
1952	1,075	1952	250
1951	495	1951	75

U. S. Bureau of Mines. *Estimated.

CONSUMPTION OF SLAB ZINC IN U. S.

(Net tons)

1958	Galvanizing	Brass & Bronze Products	Rolled Zinc	Die-casting	Miscellaneous	Totals
Jan.	26,861	9,115	3,183	26,348	3,788	69,295
Feb.	24,598	7,279	2,716	22,629	3,215	60,437
Mar.	27,171	6,871	3,138	19,045	3,753	59,978
Apr.	27,464	6,392	3,259	17,829	3,488	58,432
May	30,935	6,597	2,596	18,316	3,163	61,907
June	34,377	6,643	2,961	21,497	3,112	68,590
July	30,677	6,275	2,848	17,387	2,820	60,007
Aug.	34,663	8,358	3,379	20,832	2,801	70,033
Sept.	34,048	9,624	3,458	25,188	1,804	74,122
1957	367,757	112,390	41,269	376,039	38,165	935,620
1956	439,146	124,004	47,359	360,507	37,774	1,008,790
1955	439,697	144,816	50,363	404,790	45,002	1,084,668
1954	398,599	107,293	45,979	286,817	37,442	876,130
1953	377,688	155,608	51,318	236,689	31,480	852,783

CONSUMPTION OF LEAD IN U. S.—1957-58

(Net tons)

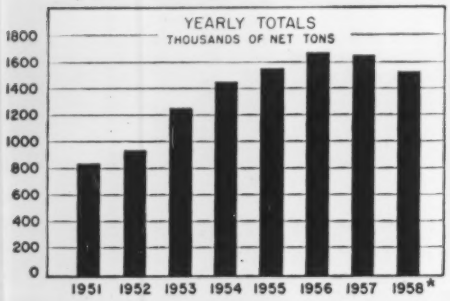
Metal Products	Total 1957	1958 Jan.	Feb.	Mar.	Apr.	May	June	July
Ammunition	42,509	3,466	3,283	3,705	3,592	3,370	3,263	2,856
Bearing Metals	26,997	1,920	1,530	1,465	1,579	1,277	1,226	1,341
Brass & Bronze	24,491	1,694	1,292	1,417	1,517	1,486	1,579	1,287
Cable Covering	108,225	5,831	5,546	6,098	6,659	6,356	7,290	4,829
Calking Lead	65,634	4,566	4,457	4,315	5,540	4,856	6,667	7,060
Casting Metals	12,672	628	450	635	754	693	651	698
Collapsible Tubes	10,316	801	628	657	631	626	686	492
Foil	4,839	220	246	232	326	408	381	394
Pipe, Traps & Bends	24,739	1,805	1,713	1,650	1,675	1,544	1,763	1,918
Sheet Lead	27,474	1,945	1,985	1,860	1,956	1,827	1,834	2,200
Solder	70,684	5,203	4,772	4,530	4,135	4,277	4,488	5,053
Storage Batteries:								
Antimonial Lead	185,617	12,512	10,186	11,583	12,827	12,236	10,864	11,943
Oxides	175,398	13,016	11,305	12,050	11,705	11,486	11,325	11,656
Terne Metal	1,642	344	122	63	56	119	61	104
Type Metal	28,726	2,191	2,031	2,122	2,309	2,180	2,072	2,234
Total Metal Products	809,963	56,143	49,546	52,382	55,161	52,741	54,150	54,085
Pigments	115,361	6,524	6,163	6,596	6,810	6,362	8,279	7,486
Chemicals	180,557	14,829	11,778	15,148	13,528	12,665	13,333	13,742
Miscellaneous Uses†	32,234	4,604	4,213	3,874	3,901	4,032	4,238	4,187
Total Consumed†	1,138,115	82,100	71,700	78,000	79,400	75,800	80,000	79,500

U. S. Bureau of Mines. †Partly estimated.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

PRIMARY ALUMINUM PRODUCTION



(Net tons)

	1958	1957	1956	1955	1954	1953	1952
Jan.	139,910	147,029	140,394	128,203	116,247	89,895	76,934
Feb.	121,980	119,059	132 763	116,236	110,483	92,649	72,374
Mar.	134,019	135,706	145 895	130,272	122,339	104,460	77,069
Apr.	124,999	139,152	144,726	126,394	120,434	102,071	76,880
May	126,327	145,174	150 800	131,128	125,138	105,464	80,803
June	115,326	138,007	145,726	127,634	120,758	104,152	77,476
July	118,541	142,041	151,624	132,669	126,161	109,285	78,368
Aug.	125,416	143,449	92 406	133,551	125,296	110,545	85,175
Sept.	124,713	129,278	132,316	130,606	120,332	109,333	76,882
Oct.	137,419	133,759	149,125	134,655	125,089	108,219	77,312
Nov.		135,024	145 081	133,689	121,252	105,836	74,639
Dec.		140,036	148,391	140,748	127,035	110,291	83,409
Totals	1,540,000*	1,647,714	1,679,247	1,565,785	1,460,564	1,252,000	937,321

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. *Estimated. U. S. Bureau of Mines.

Secondary Aluminum Production

(Net tons)

	From New Scrap	From Old Scrap	Total	As Metal	As Alloyst
1957	288,024	71,642	359,666	9,218	352,601
1956	268,095	71,673	339,768	9,471	330,297
1955	259,622	76,372	335,994	9,023	326,971
1954	232,052	59,989	292,041	5,752	286,289
1953	289,626	78,940	368,566	5,203	363,363
1952	233,258	71,264	304,522	4,897	299,625
1951	216,017	76,591	292,608	5,341	287,267
1950	167,308	76,358	243,666	2,140	241,526
1949	136,166	44,596	180,762	343	180,419
1948	191,129	95,648	286,777	2,384	284,393
1947	180,990	163,847	344,837	5,105	339,732

†Also includes chemical compounds.
U. S. Bureau of Mines.

Bauxite Production and Imports

Gross Tons—Quarterly figures are preliminaary, and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)— Arkansas	Ala., Ga., Va.	Totals	Imports as Shipped	Total New Supply
1958					
1st Qtr	288,047	11,480	299,527	1,939,248	2,238,775
2nd Qtr	283,176	7,349	290,525	2,215,284	2,505,809
1957	1,356,898	59,274	1,416,172	7,100,998	8,517,170
1st Qtr	356,628	12,077	368,705	1,433,951	1,802,656
2nd Qtr	357,111	13,293	370,404	1,600,120	1,970,524
3rd Qtr	354,121	21,049	375,170	1,960,379	2,335,549
4th Qtr	289,038	12,855	301,893	2,106,548	2,408,441
1956	1,668,432	74,912	1,743,344	5,669,833	7,413,177
1st Qtr	475,411	15,580	490,991	1,344,072	1,835,063
2nd Qtr	455,763	15,053	470,816	1,400,017	1,870,833
3rd Qtr	327,801	29,519	357,320	1,438,240	1,795,560
4th Qtr	409,457	14,760	424,217	1,487,684	1,911,901
1955	1,721,243	67,098	1,788,341	5,221,008	7,009,349
1954	1,949,368	45,528	1,994,896	5,258,530	7,253,426
1953	1,529,976	49,763	1,579,739	4,390,576	5,970,315
1952	1,603,833	63,214	1,667,047	3,497,939	5,164,984
1951	1,815,274	33,402	1,848,676	2,819,676	4,668,352
1950	1,307,335	27,192	1,334,527	2,516,247	3,850,774
1949	1,094,924	53,868	1,148,792	2,688,164	3,836,956
1948	1,395,341	61,807	1,457,148	2,488,915	3,946,063
1947	1,153,563	48,492	1,202,055	1,821,580	3,023,635

U. S. Bureau of Mines.

Antimony Consumption

Industrial use of primary antimony—Net tons

PRODUCTS	1957	1956	1955	1954
Ammunition	12	14	5	5
Antimonial Lead & Battery Metal	3,983	2,907	2,519	3,114
Bearing Metal & Bearings	944	1,077	831	816
Cable Covering	183	190	146	156
Castings	106	57	67	70
Collapsible Tubes & Foil	20	12	24	47
Sheets & Pipe	258	300	157	238
Solder	90	144	131	148
Type Metal	399	528	598	613
Other Metal	153	137	161	118
Nonmetal Products	5,783	7,531	7,833	6,855
Totals	11,931	12,897	12,472	12,180

U. S. Bureau of Mines.

Antimony Production

Domestic mine production of ores and concentrates—Net tons

Year	Gross Weight	—Antimony Content— Quantity	Average Per Cent
1957	4,192	709	16.9
1956	3,505	590	16.9
1955	3,967	633	16.0
1954	4,685	766	16.4
1953	2,161	372	17.2
1952	4 854	2,160	44.5

U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' shipments, thousands of pounds

Period	Totals	Plates, Sheets, and Strip	Rolled Structural Shapes, Rods, Bars, Wire	Extruded Shapes, Blooms, and Tubing	Powder, Flake, and Paste; Forgingst
1958*	2,555,000	1,337,000	340,000	800,000	78,000
Jan.	193,678	102,041	28,490	57,188	5,959
Feb.	179,035	93,856	25,138	53,981	6,060
Mar.	190,092	100,825	25,516	57,718	6,033
Apr.	211,485	113,005	28,255	63,456	6,769
May	217,299	115,660	27,361	67,376	6,902
June	228,266	118,429	28,674	74,595	6,568
July	229,654	118,790	32,132	72,272	6,460
Aug.	213,419	110,009	28,948	67,824	6,638
Sept.	231,087	119,312	29,936	75,164	6,675
1957	2,677,423	1,396,502	399,040	789,430	92,451
Jan.	234,947	125,517	36,544	64,227	8,659
Feb.	207,459	110,215	30,963	58,296	7,985
Mar.	230,418	120,077	34,998	66,400	8,943
Apr.	238,845	126,754	35,438	68,284	8,369
May	250,424	130,248	36,893	74,363	8,920
June	228,081	117,132	33,480	69,442	8,027
July	249,588	130,624	39,975	71,247	7,742
Aug.	224,324	117,796	31,551	66,781	8,196
Sept.	216,023	111,271	33,884	63,247	7,621
Oct.	232,820	121,608	33,709	70,873	6,630
Nov.	186,974	95,239	24,210	61,998	5,527
Dec.	177,520	90,021	27,395	54,272	5,832
1956	2,885,808	1,568,117	421,201	792,403	104,087
1955	2,791,791	1,542,723	367,951	775,092	106,025
1954	2,086,562	1,165,076	361,281	513,300	46,905

U. S. Bureau of the Census. †Forgings not included for 1954.
*Est.mated.

Antimony Imports

(Net tons)

Year	—Antimony Ore— Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	Type Metal & Antimonial Leadt	Antimony Oxide
1957	21,374	8,198	38	5,052	(n.a.)	1,893
1956	17,424	6,572	46	4 693	(n.a.)	1,489
1955	16,307	7,514	46	3,671	(n.a.)	2,210
1954	12 870	4,722	33	2,825	4,088	1,476
1953	17,242	7,778	15	2,627	1,350	1,296
1952	18,246	7,945	34	3,354	1,494	1,766

U. S. Bureau of Mines. (n.a.)—Not available. †Estimated Sb content.

Magnesium Wrought Products

Shipments—Thousands of pounds

	1958	1957	1956	1955	1954	1953
Jan.	1.272	2,130	2,118	1,776	972	1,313
Feb.	1,280	2,522	1,901	1,648	1,058	1,454
Mar.	1,398	2,388	2,351	1,947	1,290	1,601
Apr.	1,480	2,510	2,279	1,756	892	1,708
May	1,444	2,230	2,462	1,836	1,128	1,699
June	1,710	1,881	2,302	1,678	1,312	1,192
July	1,228	1,428	2 002	1,437	1,032	1,589
Aug.	1,823	1,540	2,523	1,742	1,111	1,433
Sept.	1,807	1,501	2,031	2,158	1,183	1,254
Oct.	1,983	1,453	861	1,666	1,002	1,409
Nov.		1,230	2,141	1,954	1,243	1,314
Dec.		1,102	2,452	1,576	1,673	919
Totals	21,915	25,423	21,174	13,743	16,885	

U. S. Bureau of the Census.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

U.S. Tin Imports

Ore (tin content) and Metal (bars, blocks, pigs, etc.) in gross tons

1958	Ore	Metal
Jan.	0	2,900
Feb.	0	2,915
Mar.	0	4,267
Apr.	0	3,173
May	0	2,621
June	0	4,510
July	45	2,153
Aug.	55	3,558
MONTHLY AVERAGES		
1957	15	4,676
1956	1,390	5,217
1955	1,675	5,393
1954	1,845	5,470
1953	2,998	6,212
1952	2,208	6,704
1951	2,469	2,315
1950	2,169	6,910
1949	3,193	5,019

International Tin Study Group.

U.S. Silver Output

(Thousands of ounces; commercial bars, 0.999 fine, and other refined forms)

	From Domestic Ores†	From Foreign Ore	Total
1958*	34,000	37,000	71,000
Jan.	3,520	3,551	7,071
Feb.	3,589	2,790	6,379
Mar.	2,465	3,568	6,033
Apr.	3,123	3,056	6,179
May	2,597	2,660	5,257
June	3,243	3,210	6,453
July	2,127	2,494	4,621
Aug.	2,651	3,235	5,886
1957	36,279	34,932	71,211
1956	38,157	40,160	78,317
1955	37,500	40,000	77,500
1954	38,059	39,422	77,481
1953	34,697	37,764	72,461
1952	40,245	36,653	76,898
1951	39,967	33,837	73,804
1950	42,068	37,656	79,724
1949	34,559	28,226	62,785

†Includes purchases of crude silver by the U. S. Mint. *Estimated. American Bureau of Metal Statistics.

Magnesium Ingot Production

Net Tons

	1958	1957	1956	1955
Jan.	5,272	7,111	6,337	5,089
Feb.	3,526	6,309	5,908	4,646
Mar.	3,235	7,175	6,348	4,942
Apr.	2,772	7,020	6,061	1,859
May	2,467	7,028	6,359	4,277
June	1,784	6,534	6,038	4,757
July	1,799	6,598	1,136	5,112
Aug.	1,845	6,958	3,314	5,880
Sept.	1,791	6,296	6,128	5,923
Oct.		6,276	6,735	6,286
Nov.		5,823	6,818	6,130
Dec.		5,648	7,085	6,229
Totals	30,000*	78,865	68,347	61,130

Magnesium Association. *Estimated.

U.S. Tin Consumption

Gross Tons

1958	Consumption: Primary	Consumption: Secondary	Consumption: Totals	Stocks
Jan.	3,950	2,370	6,320	22,131
Feb.	3,720	1,965	5,685	22,045
Mar.	3,880	2,040	5,920	23,070
Apr.	3,975	2,025	6,000	21,590
May	3,830	1,945	5,775	21,900
June	3,885	1,955	5,840	22,670
July	3,955	1,810	5,765	23,925
Aug.	4,250	1,815	6,065	24,180
Sept.	4,350	2,030	6,380	23,640
1957	54,429	28,078	82,507	24,158
1956	60,470	29,854	90,324	36,381
1955	59,828	30,655	90,483	35,362
1954	54,427	28,464	82,891	29,552
1953	53,959	31,681	85,640	51,546
1952	45,323	27,950	73,273	46,625
1951	56,884	31,285	88,169	31,532
1950	71,191	33,273	104,464	63,486
1949	47,163	25,243	72,406	59,813
1948	59,863	30,925	90,789	63,517
1947	59,166	28,934	88,100	68,728

International Tin Study Group; U. S. Bureau of Mines. (n.a.) = Not available.

Nickel Production

Net Tons

	Canada	Other Countries†	Estimated Totals
1958*	160,000	60,000	220,000
1957	188,962	70,877	259,839
1956	178,750	52,250	231,000
1955	174,950	40,050	215,000
1954	161,250	30,750	192,000
1953	143,000	27,000	170,000
1952	140,020	23,020	163,580
1951	137,900	46,100	184,000
1950	123,660	38,340	162,000
1949	128,690	32,310	161,000
1948	131,740	34,660	166,400
1947	118,621	35,679	154,300
1946	96,062	42,538	138,600
1945	122,565	37,435	160,000
1944	137,299	35,701	173,000
1943	144,009	40,091	184,100
1942	142,606	31,594	174,200
1941	141,129	37,471	178,600

*Estimated. †Free World. U. S. Bureau of Mines; Dominion Bureau of Statistics; STEEL.

Tungsten

U. S. Mines—Pounds

1958	Production	Shipments	Industry Stocks
Jan.	418,000	382,000	8,874,000
Feb.	339,000	259,000	8,900,000
Mar.	359,000	359,000	8,653,000
Apr.	369,000	70,000	9,058,000
May	352,000	242,000	8,750,000
June	387,000	109,000	9,289,000
1957	8,032,000	5,254,000	8,429,000
1956	14,761,000	14,027,000	4,457,000
1955	15,833,000	15,619,000	4,025,000
1954	13,166,000	13,030,000	4,275,000
1953	9,259,000	9,128,000	4,698,000

U. S. Bureau of Mines.

World Tin

Gross Tons

1958*	Production 138 000	Consumption 145,000	Stocks 84,000
Jan.	15,000	12,300	84,400
Feb.	11,600	11,900	84,000
Mar.	11,900	12,200	86,200
Apr.	9,900	12,300	86,300
May	10,700	11,900	85,100
June	10,800	12,100	83,600
July	12,600	12,100	(n.a.)
Aug.	(n.a.)	12,000	(n.a.)
1957	168,500	157,000	66,300
1956	177,000	160,500	70,300
1955	178,500	154,500	66,800
1954	184,500	142,500	67,000
1953	181,000	134,500	62,200
1952	168,500	132,500	100,400
1951	168,000	140,000	93,000
1950	174,000	152,000	118,200
1949	168,000	114,000	130,800

*Estimated. (n.a.) = Not available. International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals.

Chrome Ore

Net Tons

1958	Domestic Production	Imports	New Supply	Consumption
8 Mo.	101,292	968,133	1,069,425	687,119
Jan.	14,543	93,634	108,177	99,799
Feb.	14,111	143,373	157,484	84,286
Mar.	13,963	65,274	79,237	95,894
Apr.	13,582	104,671	118,253	85,677
May	16,872	175,675	192,547	87,047
June	8,877	133,670	142,547	72,663
July	9,785	76,397	86,182	71,122
Aug.	9,559	154,775	164,334	90,631
1957	166,157	2,281,591	2,447,748	1,760,469
1956	207,662	2,175,056	2,382,718	1,846,600
1955	153,253	1,833,999	1,987,252	1,583,983
1954	163,365	1,471,037	1,634,402	913,973

U. S. Bureau of Mines.

Molybdenum Products

Ferromolybdenum, molybdic oxide, and molybdenum salts and metal

Pounds

1958	Production	Shipments†	Stocks†
Jan.	3,513,000	3,401,000	6,154,000
Feb.	3,089,000	2,386,000	7,113,000
Mar.	3,710,000	2,544,000	8,637,000
Apr.	3,419,000	2,379,000	9,976,000
May	1,883,000	2,093,000	10,047,000
June	1,296,000	2,067,000	9,703,000
July	1,292,000	2,243,000	8,893,000
Aug.	1,592,000	2,704,000	7,984,000
Sept.	2,283,000	2,899,000	7,756,000
1957	37,639,000	36,906,000	5,789,000
1956	41,208,000	42,820,000	2,812,000
1955	37,774,000	38,606,000	3,156,000
1954	24,328,000	25,357,000	3,430,000
1953	30,283,000	30,701,000	3,894,000
1952	32,383,000	32,054,000	3,373,000

†Including exports. ‡Producers'.
U. S. Bureau of Mines.

Manganese

(Supplies for U. S. consumption, net tons)

1958	Domestic Mine Shipments	General Imports: Ore	General Imports: Ferro-manganese†	Exports: Ore	Exports: Ferro-manganese†	Net Supply
8 Mo.	210,200	1,767,122	81,842	3,530	2,652	2,053,000
Jan.	28,500	326,064	15,884	231	384	370,000
Feb.	24,200	224,980	10,174	417	140	259,000
Mar.	24,200	254,129	2,340	540	550	280,000
Apr.	26,200	224,045	9,718	607	298	259,000
May	28,800	204,944	5,152	430	542	238,000
June	25,600	187,523	5,674	606	182	218,000
July	26,000	200,349	8,142	168	480	234,000
Aug.	26,700	145,150	24,818	531	76	196,000
1957	366,334	3,105,172	411,446	5,267	16,256	3,861,000
1956	344,735	2,238,568	488,436	6,131	5,984	3,060,000
1955	287,255	2,078,205	242,658	6,279	4,488	2,597,000
1954	206,128	2,165,694	116,088	6,112	4,348	2,477,000

†Expressed in terms of ore.

U. S. Bureau of Mines.

Molybdenum Concentrates

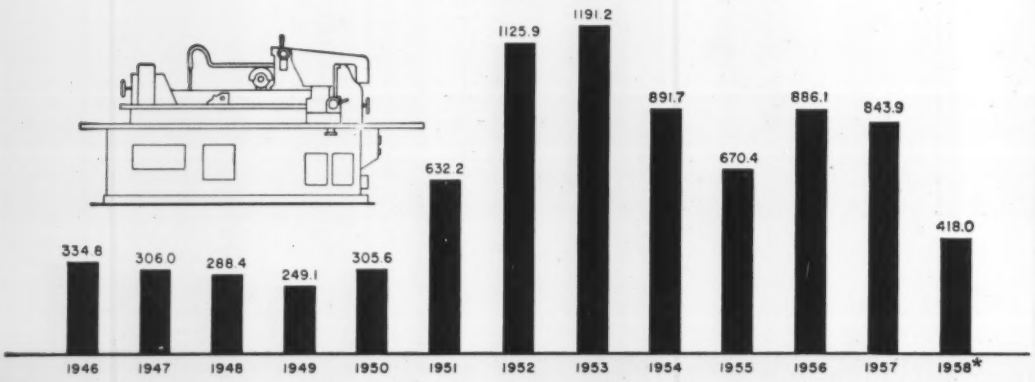
Pounds

1958	Production	Shipments†	Consumption	Stocks
Jan.	4,949,000	4,872,000	3,668,000	7,150,000
Feb.	4,824,000	4,309,000	3,244,000	7,792,000
Mar.	5,181,000	4,315,000	3,805,000	8,678,000
Apr.	3,931,030	4,200,000	3,453,000	8,182,000
May	3,546,000	2,390,000	1,841,000	9,430,000
June	3,116,000	2,368,000	1,260,000	10,373,000
July	1,988,000	1,998,000	1,235,000	10,469,000
Aug.	742,000	1,959,000	1,607,000	8,912,000
Sept.	1,302,000	3,198,000	2,248,000	6,404,000
1957	60,753,000	57,143,000	38,954,000	7,093,000
1956	57,462,000	57,126,000	42,652,000	2,920,000
1955	61,781,000	64,709,000	38,799,000	2,730,000

†Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa.
U. S. Bureau of Mines.

YEARLY SHIPMENTS

Millions of Dollars



MACHINE TOOLS (Metal Cutting Types Only)

NET NEW ORDERS† (Thousands)

	1958			1957		
	Domestic	Foreign	Totals	Domestic	Foreign	Totals
Jan.	$15,950	$3,350	$19,300	$56,300	$6,950	$63,250
Feb.	18,550	4,250	22,800	51,100	7,100	58,200
Mar.	23,450	6,000	29,450	51,300	7,600	58,900
Apr.	16,600	6,300	22,900	45,700	5,600	51,300
May	18,450	3,450	21,900	37,950	3,450	41,400
June	18,550	4,500	23,050	40,050	3,050	43,100
July	17,200	3,700	20,900	50,500	5,000	55,500
Aug.	16,550	2,700	19,250	40,400	4,100	44,500
Sept	18,350	1,750	20,100	25,000	3,800	28,800
Oct.	24,200	4,250	28,450	23,650	4,150	27,800
Nov.	.....	....	.....	25,050	3,300	28,350
Dec.	.....	....	.....	15,150	3,500	18,650
10 Mo. Totals	$187,850	$40,250	$228,100			
Annual Totals				$462,150	$57,600	$519,750

YEARLY TOTALS

	Domestic	Foreign	Totals
1956	$828,650	$95,350	$924,000
1955	846,250	80,850	927,100
1954	458,150	56,300	514,450
1953	692,250	55,800	748,050
1952	748,950	53,600	802,550
1951	1,364,450	163,500	1,527,950
1950	596,500	115,950	712,450
1949	169,600	63,500	233,100
1948	217,950	43,000	260,950
1947	186,500	53,550	240,050

†Gross orders minus cancellations.

SHIPMENTS (Thousands)

	1958			1957		
	Domestic	Foreign	Totals	Domestic	Foreign	Totals
Jan.	$42,000	$5,750	$47,750	$67,550	$9,000	$76,550
Feb.	34,400	4,100	38,500	72,050	5,650	77,700
Mar.	41,300	4,550	45,850	78,800	10,300	89,100
Apr.	34,950	5,250	40,200	77,650	10,150	87,800
May	32,650	4,950	37,600	70,900	7,600	78,500
June	30,900	4,550	35,450	72,850	10,100	82,950
July	18,900	4,300	23,200	51,500	7,200	58,700
Aug.	19,300	3,850	23,150	58,000	5,200	63,200
Sept.	23,100	4,100	27,200	58,600	6,150	64,750
Oct.	29,100	3,550	32,650	53,500	7,400	60,900
Nov.	.....	....	.....	41,700	5,900	47,600
Dec.	.....	....	.....	50,250	5,900	56,150
10 Mo. Totals	$306,600	$44,950	$351,550			
Annual Totals				$753,350	$90,550	$843,900

YEARLY TOTALS

	Domestic	Foreign	Totals
1956	$804,600	$81,550	$886,150
1955	600,000	70,400	670,400
1954	813,250	78,500	891,750
1953	1,078,050	113,150	1,191,200
1952	1,003,200	122,700	1,125,900
1951	569,000	63,250	632,250
1950	245,950	59,600	305,550
1949	186,850	62,300	249,150
1948	237,700	50,750	288,450
1947	224,600	81,400	306,000

National Machine Tool Builders' Association. *Estimated.

MACHINE TOOLS (Forming Types Only)

Value in Thousands

	1958 NET NEW ORDERS			1958 SHIPMENTS			1957 NET NEW ORDERS			1957 SHIPMENTS		
	Domestic	Foreign	Totals	Domestic	Foreign	Totals	Domestic	Foreign	Totals	Domestic	Foreign	Totals
Jan.	$6,050	$1,500	$7,550	$8,800	$1,250	$10,050	$11,400	$850	$12,250	$21,900	$1,450	$23,350
Feb.	5,200	300	5,500	8,750	800	9,550	13,400	300	13,700	24,350	1,300	25,650
Mar.	6,350	350	6,700	7,200	1,100	8,300	13,300	550	13,850	24,550	1,950	26,500
Apr.	4,250	1,150	5,400	9,250	1,450	10,700	11,750	1,250	13,000	19,350	3,500	22,850
May	5,400	750	6,150	9,050	3,450	12,500	11,800	450	12,250	23,050	2,750	25,800
June	5,750	3,300	9,050	8,000	2,050	10,050	9,150	550	9,700	21,700	2,300	24,000
July	4,750	900	5,650	5,600	900	6,500	6,400	750	7,150	21,600	1,150	22,750
Aug.	6,650	2,400	9,050	5,650	1,000	6,650	7,750	650	8,400	13,500	1,600	15,100
Sept.	6,300	1,700	8,000	6,550	1,150	7,700	6,900	1,050	7,950	14,100	3,200	17,300
Oct.	7,850	700	8,550	6,600	1,900	8,500	9,050	2,850	11,900	12,550	2,600	15,150
Nov.	....	....	....	....	....	....	5,750	1,050	6,800	9,900	2,250	12,150
Dec.	....	....	....	....	....	....	4,900	1,300	6,200	13,000	950	13,950
10 Mo. Totals	$58,550	$13,050	$71,600	$75,450	$15,050	$90,500						
1957 Totals							$111,550	$11,600	$123,150	$219,550	$25,000	$244,550
1956 Totals							$210,750	$17,250	$228,000	$294,900	$14,000	$308,900

National Machine Tool Builders' Association.

METALWORKING MACHINERY (Forming and Shaping Types)

VALUE OF SHIPMENTS (Thousands)

	Bending, Forming Machines	Hydraulic, Pneumatic Presses	Mechanical-Power Driven Presses	Manual Presses	Punching, Shearing Machines	Forging Machines, Hammers	Wire, Met. Ribbon Form. Machines	Riveting Machines	Misc. Forming, Cutting Machines
1958									
1st Qtr	$5,789	$9,221	$9,839	$94	$6,863	$6,197	$656	$642	$1,153
2nd Qtr	6,043	9,787	12,703	112	5,764	4,656	772	940	1,386
3rd Qtr	5,267	7,827	5,621	174	7,462	2,533	358	778	1,047
1957	33,245	85,451	135,097	437	26,479	10,830	2,694	3,005	10,567
1956	30,174	25,045	195,243	664	25,776	10,814	2,932	3,916	9,918

VALUE OF NEW ORDERS (Thousands)

1958								
1st Qtr	$5,539	$4,170	$7,524	$83	$4,565	$1,839	$475	$833	$713
2nd Qtr	5,150	5,230	6,459	120	4,801	3,113	588	842	1,874
3rd Qtr	5,270	3,926	10,128	116	5,065	2,146	278	845	1,317
1957	25,719	26,294	50,207	294	20,948	6,083	1,776	2,348	6,605
1956	25,515	39,509	117,618	542	23,520	12,290	2,680	2,598	10,182

U. S. Bureau of the Census.

*Estimated.

FACTORY SHIPMENTS
(Value in thousands)

PRODUCERS' SHIPMENTS OF MACHINE TOOLS Value in Thousands

	Boring Machines	Broaching Machines	Drilling Machines	Gear Cutting, Finishing Machines	Grinding, Polishing Machines	Lathes	Milling Machines	Planers	Shapers (except gear shapers)	All Others	Totals
1957	$101,723	$16,332	$54,611	$38,944	$157,761	$196,448	$154,628	$8,189	$4,194	$129,684	$862,514
1956	101,838	20,309	65,370	49,380	172,803	217,054	115,817	6,445	4,864	137,932	891,812
1955	77,372	14,457	53,805	36,565	123,899	153,285	89,573	7,511	4,616	104,678	665,797
1954	114,443	17,253	86,066	48,111	154,288	206,886	122,518	10,978	5,692	124,528	890,763
1953	163,648	21,874	114,258	44,891	219,287	312,165	196,124	10,445	10,932	75,735	1,169,359

U. S. Bureau of the Census.

Industrial Trucks and Tractors

Units Shipped

ELECTRIC TRUCKS (Rider Type)

	1958	1957	1956	1955	1954
Jan.	383	480	409	342	523
Feb.	370	385	491	359	467
Mar.	394	411	503	425	473
Apr.	373	455	503	406	366
May	325	429	520	833	415
June	277	433	533	533	445
July	353	420	512	455	413
Aug.	211	242	374	346	357
Sept.	294	302	442	441	357
Oct.	...	373	491	449	348
Nov.	...	366	501	441	359
Dec.	...	389	442	520	394
Totals	...	4,685	5,721	5,550	4 947

YEARLY TOTALS

1953	8,992	1951	6,525
1952	7,409	1950	2,808

HAND TRUCKS (Motorized)

1958

Jan.	515	July	453
Feb.	471	Aug.	233
Mar.	459	Sept.	385
Apr.	456	Oct.	...
May	415	Nov.	...
June	353	Dec.	...
1957	21,110	1956	7,470

GASOLINE-POWERED TRUCKS AND TRACTORS

1958

Jan.	1,305	July	1,134
Feb.	1,264	Aug.	1,182
Mar.	1,453	Sept.	1,510
Apr.	1,563	Oct.	....
May	1,365	Nov.	....
June	1,324	Dec.	....
1957	21,110	1956	25,716

U. S. Bureau of the Census.

Pumps

Steam, Power, Centrifugal, Rotary

New Orders—Thousands of Dollars

	1958	1957	1956	1955
Jan.	5,261	9,601	8,094	5,220
Feb.	5,918	7,551	7,735	6,709
Mar.	6,004	7,654	8,987	6,161
Apr.	5,313	7,801	8,865	5,447
May	6,728	7,786	9,903	6,411
June	5,467	8,228	8,240	7,419
July	5,088	7,143	7,587	5,834
Aug.	5,663	6,982	8,336	7,022
Sept.	....	6,177	8,436	5,664
Oct.	....	6,158	9,188	7,048
Nov.	....	5,838	8,522	5,219
Dec.	....	4,906	6,838	7,624
Totals	....	85,825	100,731	75,808

U. S. Bureau of the Census.

Industrial Control Apparatus

Sales

1958

(9 Mo.)	$175,453,711	1954	$179,253,471
1957	285,345,548	1953	205,357,230
1956	273,690,705	1952	208,908,893
1955	194,165,278	1951	179,933,669

National Electrical Manufacturers Association.

Central Air Conditioning

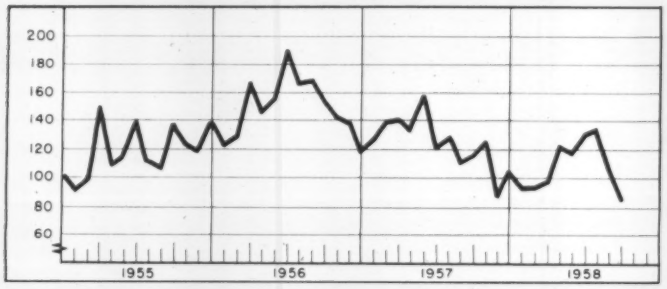
Value of Systems Installed

1957	$598,900,000	1953	$295,920,000
1956	528,180,000	1952	252,920,000
1955	434,120,000	1951	278,200,000
1954	378,810,000	1950	241,770,000

Air-Conditioning & Refrigeration Institute.

MATERIAL HANDLING EQUIPMENT

(Bookings Index—1954=100)



	1958	1957	1956	1955	1954
Jan.	93.07	126.34	122.48	91.69	93.56
Feb.	93.49	139.29	129.56	98.71	96.45
Mar.	97.89	140.76	166.14	149.16	115.55
Apr.	122.36	132.67	145.20	109.52	122.76
May	118.04	157.95	155.53	115.61	98.54
June	131.15	121.57	189.13	139.88	112.42
July	134.34	128.31	165.05	111.76	91.68
Aug.	104.46	110.09	168.70	106.24	94.06
Sept.	85.41	116.79	152.51	136.08	88.43
Oct.	....	124.80	143.38	123.52	95.41
Nov.	....	87.80	138.50	118.09	88.66
Dec.	....	105.65	117.76	139.85	102.49

YEARLY AVERAGES

1958 (9 Mo.)	108.91	1956	149.60
1957	124.37	1955	120.01
	1954	100.00	

Material Handling Institute Inc.

Air Conditioning, Commercial Refrigeration Equipment

Factory Shipments—Number of Units and Value in Thousands of Dollars

	CONDENSING UNITS		COMPRESSORS, COMPRESSOR UNITS		ICEMAKING MACHINES	
	Number	Value	Number	Value	Number	Value
1957	549,141	67,390	3,179,910	149,203	30,596	17,364
1956	616,823	80,414	3,785,395	166,718	31,416	18,112
1955	589,335	71,067	2,554,031	116,917	31,521	16,369
1954	570,418	63,699	n.a.	127,076	n.a.	11,960
1953	966,136	74,013	2,380,739	121,054	28,228	14,385
1952	654,223	61,439	1,677,300	71,047	26,693	12,838
1951	840,176	75,672	1,051,937	56,669	12,998	8,804

	CENTRIFUGAL REFRIGERATION SYSTEMS		HEAT EXCHANGER EQUIPMENT		PACKAGED AIR CONDITIONING EQUIPMENT	
	Number	Value	Number	Value	Number	Value
1957	1,107	34,077	.....	129,995	1,800,766	440,441
1956	921	29,105	.....	143,088	2,082,768	494,998
1955	818	25,732	.....	111,064	1,480,095	209,961
1954	556	19,868	.....	107,923	1,496,113	241,871
1953	469	14,970	.....	82,602	1,137,293	293,644
1952	363	14,040	.....	63,666	438,464	135,579
1951	441	15,300	.....	64,935	282,488	93,573

U. S. Bureau of the Census.

n.a.=not available.

Air Handling Equipment

Shipments—Thousands of Dollars

	Blowers and Fans		Air Washers		Unit Heaters	
Qtrs	1958	1957	1958	1957	1958	1957
1st	34,407	58,065	657	749	26,303	18,022
2nd	38 040	60,832	818	829	20,075	18,770
3rd	.....	46,208	...	431	.....	20,823
4th	.....	41,275	...	587	.....	23,525
Totals	.....	206,380	...	2,596	.....	81,140

U. S. Bureau of the Census.

Industrial Supplies and Machinery

Seasonally Adjusted New Order Index—July, 1948=100

	1958	1957	1956	1955	1954	1953
January	163	221	190	160	141	163
February	157	219	190	166	138	162
March	149	210	190	171	133	170
April	148	204	195	172	130	176
May	152	199	199	177	127	171
June	161	199	197	189	132	164
July	170	197	203	182	132	162
August	172	197	211	186	136	159
September	178	203	203	196	143	148
October	187	192	206	195	141	147
November	...	180	220	194	141	148
December	...	167	218	191	152	145
Mo. Avg	...	199	202	182	137	160

American Supply & Machinery Manufacturers' Association Inc.

Screw Machine Products

Index—1946-49=100

SHIPMENTS

	1958	1957	1956	1955	1954
Jan.	165	206	216	173	174
Feb.	145	185	214	174	161
Mar.	141	197	215	199	171
Apr.	141	193	199	204	158
May	134	192	191	201	146
June	133	173	178	212	143
July	124	139	137	144	109
Aug.	142	173	172	187	140
Sept.	151	168	164	190	143
Oct.	182	184	202	201	154
Nov.	...	159	180	198	148
Dec.	...	144	167	195	158

Yearly Averages

1957	176	1954	150
1956	186	1953	228
1955	190	1952	198

NEW ORDERS

Jan.	138	211	208	186	130
Feb.	137	181	207	191	118
Mar.	122	185	224	239	131
Apr.	108	183	184	198	133
May	139	167	165	201	123
June	142	166	154	191	126
July	138	159	142	183	114
Aug.	154	147	170	220	133
Sept.	161	181	143	208	150
Oct.	204	184	213	216	151
Nov.	...	135	175	200	166
Dec.	...	110	167	203	199

Yearly Averages

1957	167	1954	139
1956	179	1953	188
1955	203	1952	194

National Screw Machine Products Association.

Heat Treating

Billings—Thousands of Dollars

	1958	1957	1956
Jan.	2,780.4	3,533.9	3,116.4
Feb.	2,436.4	3,378.9	3,124.8
Mar.	2,495.4	3,631.8	3,370.9
Apr.	2,542.6	3,572.4	3,166.2
May	2,421.5	3,389.6	3,350.7
June	2,374.8	2,989.4	3,065.2
July	2,139.6	2,814.6	2,737.4
Aug.	2,213.0	2,874.1	3,126.6
Sept.	2,457.1	2,765.0	2,858.6
Oct.	2,744.9	3,076.2	3,468.5
Nov.	.....	2,641.4	3,238.2
Dec.	.....	2,565.4	2,998.9

Metal Treating Institute.

Foundry Equipment Sales

Index of Net Orders Closed for New Equipment
1947-49=100

	1958	1957	1956	1955
Jan.	57.9	117.9	195.6	81.0
Feb.	57.6	188.4	169.0	90.4
Mar.	85.9	127.0	152.7	163.6
Apr.	88.7	101.1	135.2	178.6
May	136.1	136.2	207.0	145.7
June	87.7	187.5	156.7	186.8
July	77.9	98.6	110.3	213.4
Aug.	74.1	231.3	188.3	134.0
Sept.	64.5	113.9	114.7	156.7
Oct.	....	145.3	122.2	108.6
Nov.	....	59.6	121.0	154.4
Dec.	....	61.4	115.6	183.9
Mo. Avg	....	130.7	149.0	149.8

Foundry Equipment Manufacturers Association.

Typewriters

Factory Shipments

	1958 Units	1958 Value (000)	1957 Units	1957 Value (000)
Jan.	79,717	$10,880	135,523	$17,203
Feb.	64,026	9,539	113,224	14,504
Mar.	88,566	11,515	133,075	17,043
Apr.	92,267	12,734	143,012	18,580
May	84,127	12,875	136,839	17,996
June	85,454	13,224	141,960	17,747
July	102,556	12,928	124,625	14,878
Aug.	125,833	15,748	147,205	16,806
Sept.	139,562	16,888	154,960	17,669
Oct.	144,172	17,251	171,733	19,624
Nov.	.....	.....	116,277	13,631
Dec.	.....	.....	126,856	13,696

YEARLY TOTALS

1957	1,645,289	$199,377	1955 1,258,466	$148,008
1956	1,500,704	182,859	1954 n.a.	123,497

n.a.=not available.
U. S. Bureau of the Census.

Office Machines

(Value, f.o.b. Plant)

	Computing, Account. Machines	Duplicating Machines	Other
1957	$605,896,000	$27,362,000	$137,180,000
1956	533,499,000	27,079,000	138,404,000
1955	431,577,000	22,288,000	115,514,000
1954	394,879,000	22,995,000	167,346,000

U. S. Bureau of the Census.

Steel Power Boilers

New Orders

(100 sq ft or more of heating surface)

GRAND TOTALS—ALL TYPES

	Number	Sq ft
1957	6,675	11,649,617
1956	7,172	16,847,981
1955	6,407	12,782,535
1954	5,496	8,472,185
1953	5,693	9,440,439
1952	5,815	12,707,581
1951	7,452	19,224,576
1950	7,996	16,868,565
1949	5,266	8,379,502

STATIONARY BOILERS

1957	n.a.	n.a.
1956	6,949	15,079,239
1955	6,310	12,394,955
1954	n.a.	n.a.
1953	5,658	9,243,028
1952	5,556	11,693,401
1951	7,171	17,698,094
1950	7,827	16,468,567
1949	5,190	8,097,503

MARINE BOILERS

1957	n.a.	n.a.
1956	223	1,768,722
1955	97	387,580
1954	n.a.	n.a.
1953	35	197,411
1952	259	1,014,180
1951	281	1,526,482
1950	169	399,998
1949	76	281,999

Steam Generating Capacity of Water Tube Boilers

(Thousands of pounds of steam per hour at maximum continuous rating)

	Totals	Stationary	Marine
1957	141,644	n.a.	n.a.
1956	247,035	226,840	20,195
1955	164,120	157,295	6,825
1954	90,669	n.a.	n.a.
1953	82,263	80,634	1,629
1952	129,474	121,374	8,100
1951	209,088	194,082	15,006
1950	187,514	184,831	2,683
1949	67,678	62,745	4,933

n.a.=not available.
U. S. Bureau of the Census.

Motors and Generators

New Orders—Thousands of Dollars

Polyphase Induc. Motors, 1-200 hp

Qtrs	1958	1957	1956
1st	33,187	49,467	53,266
2nd	37,077	49,188	63,427
3rd	36,988	44,610	55,187
4th	.....	39,178	50,155
Totals	.....	182,473	222,035

DC Generators & Motors, 1-200 hp

Qtrs	1958	1957	1956
1st	4,096	14,947	11,509
2nd	5,420	8,317	13,216
3rd	5,339	8,625	12,136
4th	....	6,441	10,645
Totals	....	38,330	47,506

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
1955	180,328	1955	40,210
1954	139,949	1954	32,376
1953	165,875	1953	32,133
1952	152,801	1952	40,483
1951	209,861	1951	43,318
1950	155,308	1950	28,874
1949	76,063	1949	16,900
1948	95,577	1948	22,273

National Electrical Manufacturers Assn.

EARTHMOVING and EXCAVATING EQUIPMENT

(Value in Thousands of Dollars)

Total Manufacturers' Shipments†

1957		1956	970,142
1st Qtr	228,926	1955	726,218
2nd Qtr	226,535	1954	543,352
3rd Qtr	181,369	1953	612,013
4th Qtr	n.a.	1952	623,261

†Does not include power cranes and shovels.

Wheel-Type Heavy Duty Industrial Tractors

	Units	Value
1957	5,133	101,567
1st. Qtr	1,513	28,600
2nd Qtr	1,753	34,877
3rd Qtr	1,346	27,528
4th Qtr	521	10,562
1956	5,339	94,587
1st Qtr	1,240	20,753
2nd Qtr	1,589	27,388
3rd Qtr	1,429	26,256
4th Qtr	1,081	20,190
1955	4,144	64,173
1954	3,019	46,801
1953	2,944	43,681
1952	4,026	59,847

Road Construction and Maintenance Machinery

	Units	Value
1957		183,648
1st Qtr		49,977
2nd Qtr		56,932
3rd Qtr		48,683
4th Qtr		28,056
1956		192,236
1st Qtr		45,653
2nd Qtr		56,046
3rd Qtr		47,548
4th Qtr		42,971
1955		151,410
1954		118,970
1953		119,674
1952		160,068

Construction Machinery for Mounting on Tractors

	Units	Value
1957		86,297
1st Qtr		27,671
2nd Qtr		24,470
3rd Qtr		20,164
4th Qtr		13,992
1956		114,753
1st Qtr		28,791
2nd Qtr		33,403
3rd Qtr		28,683
4th Qtr		23,876
1955		94,454
1954		73,877
1953		78,440
1952		75,829

U. S. Bureau of the Census.

Tracklaying Tractors

	Units	Value
1957	41,329	n.a.
1st Qtr	12,867	119,137
2nd Qtr	11,390	105,306
3rd Qtr	8,340	81,671
4th Qtr	8,732	n.a.
1956	55,417	471,384
1st Qtr	14,215	115,378
2nd Qtr	16,826	142,857
3rd Qtr	12,682	109,675
4th Qtr	11,694	103,474
1955	48,891	359,443
1954	40,374	267,918
1953	50,597	228,696
1952	48,155	280,841

Portable Well and Blast Hole Drills

	Units	Value
1957	543	5,046
1st Qtr	152	1,331
2nd Qtr	173	1,582
3rd Qtr	115	1,127
4th Qtr	103	1,006
1956	1,209	8,652
1st Qtr	334	2,177
2nd Qtr	311	2,327
3rd Qtr	434	3,140
4th Qtr	130	1,008
1955	1,166	8,021
1954	1,176	8,615
1953	907	8,002
1952	732	6,769

Trucks, Truck Tractors, Trailers, and Wagons

OFF-HIGHWAY TYPE

	Units	Value
1957*	658	6,876
1st Qtr	157	1,517
2nd Qtr	260	2,629
3rd Qtr	132	1,375
4th Qtr	109	1,355
1956*	669	6,552
1st Qtr	121	999
2nd Qtr	192	1,944
3rd Qtr	158	1,539
4th Qtr	198	2,070
1955	3,229	46,527
1954	1,519	25,126
1953	1,970	31,184
1952	2,283	32,805

*Does not include off-highway type trucks (load on back).

Gears

Index of New Orders Placed
1947-49=100

	1958	1957	1956	1955
Jan.	175.4	259.3	245.5	140.9
Feb.	179.1	239.5	256.2	148.5
Mar.	173.7	262.4	276.5	172.8
Apr.	153.2	221.7	264.7	179.8
May	142.2	263.2	275.6	205.2
June	173.8	215.9	245.4	193.5
July	133.3	211.4	286.7	201.7
Aug.	162.1	225.8	219.5	217.6
Sept.	170.7	174.9	230.5	246.5
Oct.	175.9	207.0	299.8	227.6
Nov.		165.3	216.2	210.4
Dec.		150.8	235.7	245.5
Mo. Avg	216.4	254.4	199.2	

American Gear Manufacturers Association.

Rigid Steel Conduit and Fittings

Shipments—Thousands of Feet

	1958	1957	1956
January	34,510	32,913	27,432
February	24,773	33,684	32,877
March	26,053	40,916	34,743
April	27,549	25,303	37,840
May	30,762	30,410	43,495
June	41,033	45,257	54,144
July	32,941	54,636	42,513
August	36,383	36,657	30,344
September		32,492	28,700
October		35,044	31,596
November		28,921	31,156
December		21,889	33,318
Totals		421,122	428,158

National Electrical Manufacturers Association.

Industrial Furnaces†

Net New Orders

	1958	1957	1956
Jan.	$3,047,320	$8,775,162	$13,718,917
Feb.	3,683,947	9,768,578	15,637,728
Mar.	2,870,869	10,485,477	10,499,885
Apr.	3,571,968	4,559,380	12,278,135
May	953,523	5,389,380	7,095,072
June	3,671,598	4,369,360	8,222,832
July	5,168,993	4,331,781	5,528,854
Aug.	3,532,619	3,924,212	8,110,480
Sept.	4,846,436	7,463,059	4,445,691
Oct.	3,104,677	3,673,810	10,129,471
Nov.		2,831,786	5,374,749
Dec.		3,991,669	7,236,616
Totals		$69,563,654	$108,278,430

†Other than induction heating units.
Industrial Heating Equipment Association Inc.

Induction Heating Equipment

Net New Orders

	1958	1957	1956
Jan.	$629,989	$744,454	$1,136,684
Feb.	373,604	1,027,331	856,053
Mar.	374,683	784,019	1,150,188
Apr.	434,604	606,654	1,366,111
May	501,172	927,083	1,411,778
June	602,656	715,409	847,460
July	502,764	1,325,272	970,001
Aug.	382,586	727,821	1,024,536
Sept.	888,167	470,105	1,280,125
Oct.	743,152	376,371	1,407,835
Nov.		741,399	1,400,300
Dec.		519,016	726,573
Totals		$8,964,934	$13,574,647

Industrial Heating Equipment Association Inc.

Ball Bearings and Parts

(Imports)

1958	lb	Value
8 Mo.	317,921	$952,000
1957	471,393	1,174,000
1956	538,535	1,056,664
1955†	1,169,243	2,346,333
1954†	376,397	576,383
1953	808,641	1,090,100
1952	928,940	1,453,539
1951	843,706	1,541,301
1950	85,027	156,496
1949	12,349	47,979
1948	14,396	55,091

Roller Bearings and Parts

(Imports)

1958	lb	Value
8 Mo.	252,186	$600,000
1957	740,936	1,622,000
1956	409,649	915,555
1955†	475,389	926,816
1954†	278,099	463,077
1953	881,330	1,307,201
1952	899,189	1,289,746
1951	901,351	1,241,019
1950	88,622	117,673
1949	14,464	38,955
1948	59,538	127,680

†Does not include shipments valued at less than $250.
Foreign Trade Division, U. S. Bureau of the Census.

Resistance Welding Equipment

	1958 Value of Factory Shipments (000)	1958 Net New Orders (000)	1957 Value of Factory Shipments (000)	1957 Net New Orders (000)
Jan.	$1,421.7	$1,642.7	$3,160.8	$3,310.4
Feb.	1,615.1	1,682.5	2,386.3	4,160.9
Mar.	1,658.6	2,550.1	2,845.0	2,360.4
Apr.	1,963.1	1,683.9	3,111.2	2,429.2
May	1,749.9	1,120.6	2,890.8	2,340.1
June	2,345.9	2,113.0	2,734.7	1,936.3
July	2,311.5	1,534.1	3,194.3	1,943.1
Aug.	1,419.4	1,430.6	2,591.0	1,501.1
Sept.	1,124.6	1,060.4	2,527.6	1,463.0
Oct.	1,559.0	2,885.3	1,952.7	1,933.1
Nov.	.....	.....	2,227.2	1,167.4
Dec.	.....	.....	1,969.0	1,501.5
ANNUAL SHIPMENTS				
1957	$31,590.5	1955	$30,965.1	
1956	48,311.0	1954	21,994.0	

Resistance Welder Manufacturers' Association.

Used Machine Tool Sales

Index—1947-49=100

1958			
Jan.	121.1	June	111.9
Feb.	121.9	July	115.0
Mar.	104.3	Aug.	93.4
Apr.	105.0	Sept.	113.6
May	99.5	Oct.	128.8
ANNUAL AVERAGES			
1957	128.9	1954	99.5
1956	137.9	1953	130.1
1955	115.1	1952	147.5

Machinery Dealers National Association.

Contract Stampings Shipments

Index—1947-49=100

1958					
Jan.	131	May	121	Sept.	134
Feb.	128	June	120	Oct.	141
Mar.	132	July	113	Nov.	...
Apr.	130	Aug.	134	Dec.	...
1957					
Jan.	174	May	156	Sept.	123
Feb.	178	June	156	Oct.	161
Mar.	198	July	141	Nov.	133
Apr.	173	Aug.	116	Dec.	127
YEARLY AVERAGES					
1958 (10 Mo.)	126	1957	154		

Pressed Metal Institute.

WELDING ELECTRODES

Shipments in Pounds

1958	Mild Steel	Alloy	Nonferrous	Totals
9 Mo.	250,090,187	31,939,245	897,527	282,926,959
1957	440,543,476	48,391,390	1,736,485	490,671,351
1956	471,091,044	85,997,814	2,259,929	559,348,787
1955	409,203,615	71,797,359	1,638,701	482,639,675
1954	324,260,613	52,781,433	1,340,081	378,382,127
1953	409,437,791	76,049,553	1,889,653	487,376,997
1952	425,290,499	82,633,922	1,519,208	509,443,629
1951	413,444,913	65,903,970	1,361,836	480,710,719
1950	322,954,832	42,574,710	1,861,686	367,391,228
1949	273,463,740	24,753,807	1,715,362	299,932,909
1948	369,019,831	30,214,928	2,124,496	401,359,255
1947	307,756,495	25,172,382	2,149,768	335,078,645
1946	284,126,356	24,991,208†	.....	309,117,564
1945	435,789,217	59,029,938†	.....	494,819,155

†Includes both alloy and nonferrous electrodes.
National Electrical Manufacturers Association.

ARCWELDING SETS

Units Ordered, Excluding Exports

	Single Operator, Variable Voltage, DC Sets			Transformer Welders	
1958	Motor Drive	Engine Drive	Generators Only	Industrial Type	Limited Input Type
9 Mo.	9,210	5,799	154	5,693	16,609
1957	19,981	9,995	207	11,368	15,161
1956	21,955	11,054	189	15,970	13,853
1955	17,102	9,160	260	13,965	14,041
1954	12,817	7,450	340	12,220	10,310
1953	16,362	9,673	435	13,009	10,595
1952	18,932†	11,104	227	16,794	15,489
1951	13,048†	10,333	485	15,645	16,954
1950	10,115†	8,207	272	9,652	16,674
1949	7,393†	6,193	256	7,295	12,647
1948	10,927†	10,435	385	8,792	13,690
1947	13,677†	10,882	1,169	9,719	13,034
1946	16,467†	10,622	2,818	21,093	16,949
1945	20,716†	8,776	2,795	21,448	

†Does not include rectifier type.
National Electrical Manufacturers Association.

INTERNAL COMBUSTION ENGINES

Factory Shipments

Gasoline Engines (Except Automotive, Aircraft, and Miniature)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms Number of Engines	Shipped to Other Firms Value (Thousands)
1957	4,923,718	787,400	4,136,318	$208,639
1956	5,883,349	833,008	5,050,341	233,735
1955	4,932,259	914,411	4,017,848	216,130
1954	3,669,505	675,930	2,993,575	179,323
1953	2,989,175	783,211	2,205,964	171,289
1952	2,945,050	719,436	2,225,614	188,647

Diesel Engines (Except Automotive)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms Number of Engines	Shipped to Other Firms Value (Thousands)
1957	126,961	68,828	58,133	$241,310
1956	140,814	84,352	56,462	214,830
1955	139,231	78,453	60,778	191,612
1954	104,686	56,047	48,639	172,271
1953	117,628	59,075	58,553	232,488
1952	120,538	56,060	63,878	184,575

Gas Engines (Except Automotive, Aircraft, Outboard, and Miniature)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms Number of Engines	Shipped to Other Firms Value (Thousands)
1957	20,882	13,475	11,407	$55,561
1956	20,472	11,183	9,289	47,196
1955	18,038	10,138	7,900	34,179
1954	10,691	4,501	6,190	25,993
1953	9,615	6,482	3,133	37,615

Outboard Motors

	Number	Value (Thousands)		Number	Value (Thousands)
1957	549,976	$138,823	1953	467,584	$67,489
1956	641,527	150,388	1952	337,419	46,129
1955	514,728	101,553	1951	291,697	39,456
1954	479,350	76,039	1950	367,173	41,037

U. S. Bureau of the Census.

Appliances

METALWORKING FACTS AND FIGURES

Floor and Wall Furnaces

Factory Shipments

	1958 Number of Units	1958 Value, Thousands of Dollars	1957 Number of Units	1957 Value, Thousands of Dollars
Jan.	30,327	2,008	32,774	2,130
Feb.	28,210	1,810	33,446	2,311
Mar.	29,082	1,945	29,440	1,960
Apr.	29,482	2,032	32,157	2,227
May	26,630	1,731	28,709	1,950
June	30,969	2,079	30,640	2,003
July	37,382	2,466	35,465	2,323
Aug.	41,162	2,772	42,288	2,848
Sept.	53,956	3,818	59,438	4,216
Oct.	.....	.....	68,211	4,795
Nov.	.....	.....	45,919	3,140
Dec.	.....	.....	30,584	1,975
Totals	.....	.....	469,071	31,878

YEARLY TOTALS

	Number of Units	Value, Thousands of Dollars
1956	491,930	34,895
1955	614,584	39,121
1954	584,134	36,946

U. S. Bureau of the Census.

Oil Burners

(Units sold separately)

	Residential	Commercial, Industrial	Totals
1958			
Jan.	26,416	2,011	28,427
Feb.	21,692	2,087	23,779
Mar.	16,971	1,762	18,733
Apr.	19,034	1,889	20,923
May	26,935	2,074	29,009
June	30,273	2,896	33,169
July	27,080	2,435	29,515
Aug.	34,550	3,099	37,649
Sept.	45,007	3,212	48,219
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
YEARLY TOTALS			
1957	421,685	39,470	464,155
1956	531,990	39,115	571,105
1955	609,639	40,602	650,241
1954	518,178	30,392	548,570

U. S. Bureau of the Census.

Domestic Heating Stoves

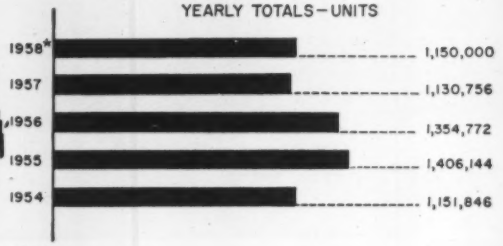
Shipments

	Coal, Wood†	Gas	Oil‡	Totals
1958				
Jan.	6,592	48,412	20,760	75,764
Feb.	7,364	51,931	32,693	94,988
Mar.	11,999	69,387	33,597	114,983
Apr.	11,632	61,214	27,192	100,038
May	12,375	63,702	21,301	97,378
June	17,334	98,481	29,419	145,234
July	24,720	131,441	46,433	202,594
Aug.	35,013	175,457	52,715	263,185
Sept.	58,129	218,012	57,637	333,778
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1957*				
Jan.	6,379	56,564	26,912	89,855
Feb.	8,021	55,660	27,035	90,716
Mar.	9,870	54,011	41,160	105,041
Apr.	14,232	55,323	34,030	103,585
May	17,406	78,250	47,700	143,356
June	22,674	106,523	31,924	161,121
July	30,686	141,641	55,911	228,241
Aug.	38,676	187,472	71,058	297,206
Sept.	43,314	206,328	64,983	314,653
Oct.	49,997	236,857	60,500	347,351
Nov.	17,055	119,539	29,206	165,800
Dec.	6,832	55,562	12,140	74,531
YEARLY TOTALS				
1957	271,038	1,439,763	521,262	2,235,063
1956	326,805	1,698,978	659,572	2,685,355
1955	394,219	1,729,061	634,474	2,667,754

† Excludes sheet metal, airtight type wood stoves.
‡ Includes kerosine stoves.
* Monthly figures do not add up to yearly total because of yearend revisions.
U. S. Bureau of the Census.

WARM AIR FURNACES

(Cast Iron and Steel)



SHIPMENTS

	1958 Number of Units	1958 Value, Thousands of Dollars	1957 Number of Units	1957 Value, Thousands of Dollars
Jan.	70,961	13,028	80,242	15,576
Feb.	68,205	11,911	70,818	13,704
Mar.	72,716	12,749	79,050	14,963
Apr.	71,992	12,678	78,505	14,999
May	79,758	13,964	78,325	14,403
June	98,608	17,213	89,702	16,063
July	94,064	16,471	90,778	17,069
Aug.	124,199	22,243	121,584	23,393
Sept.	153,269	28,008	149,179	28,947
Oct.	.....	.....	133,286	25,396
Nov.	.....	.....	96,745	18,221
Dec.	.....	.....	62,542	11,683
Totals	.....	.....	1,130,756	214,417

Yearly Totals	Number of Units	Value, in Dollars
1956	1,354,772	260,644,000
1955	1,406,144	263,865,000
1954	1,151,846	222,500,000
1953	996,603	197,275,000
1952	927,699	187,987,000
1951	871,527	180,848,000

U. S. Bureau of the Census. *Estimated.

Forced Air Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Totals
1958				
Jan.	521	20,979	46,209	67,709
Feb.	466	19,500	45,287	65,253
Mar.	442	18,721	50,243	69,406
Apr.	498	19,175	49,075	68,748
May	401	21,655	54,591	76,647
June	698	25,823	67,455	93,976
July	956	25,669	62,594	89,219
Aug.	1,386	34,627	81,627	117,640
Sept.	2,105	43,420	99,870	145,395
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1957†				
Jan.	678	23,530	47,252	71,460
Feb.	432	20,605	41,956	62,993
Mar.	551	21,304	48,463	70,318
Apr.	485	21,604	48,303	70,392
May	544	21,788	48,381	70,713
June	818	25,362	54,213	80,393
July	933	24,192	55,331	80,456
Aug.	1,736	37,344	68,778	107,858
Sept.	2,364	45,016	84,687	132,067
Oct.	1,797	37,291	78,096	117,184
Nov.	916	26,260	59,414	86,590
Dec.	466	15,683	39,964	56,113
YEARLY TOTALS				
1957	14,917	334,591	717,992	1,067,533
1956	20,293	407,310	844,362	1,271,965
1955	14,866	464,605	824,643	1,306,817
1954	12,961	407,540	613,062	1,033,563

† Monthly figures do not add up to yearly total because of yearend revisions.
U. S. Bureau of the Census.

Gravity Air-Flow Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Totals
1958				
Jan.	1,352	181	1,719	3,252
Feb.	1,376	212	1,364	2,952
Mar.	1,354	163	1,793	3,310
Apr.	1,372	139	1,733	3,244
May	1,182	147	1,782	3,111
June	2,066	221	2,315	4,632
July	1,913	272	2,660	4,845
Aug.	2,516	284	3,729	6,559
Sept.	3,494	398	3,982	7,874
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1957†				
Jan.	2,088	207	1,976	4,271
Feb.	1,828	265	1,752	3,845
Mar.	1,487	236	2,567	4,290
Apr.	1,681	189	1,822	3,692
May	1,208	158	1,827	3,193
June	1,727	165	2,366	4,258
July	2,525	258	2,442	5,225
Aug.	3,250	552	3,096	6,898
Sept.	4,307	482	3,941	8,730
Oct.	4,015	337	4,284	8,636
Nov.	1,976	264	2,470	4,710
Dec.	1,179	121	1,606	2,906
YEARLY TOTALS				
1957	29,698	2,742	30,733	63,223
1956	38,788	4,808	39,211	82,807
1955	44,920	5,735	48,662	99,327
1954	42,207	11,108	64,968	118,283

† Monthly figures do not add up to yearly total because of yearend revisions.
U. S. Bureau of the Census.

Cast Iron Radiators and Convectors

Shipments in thousands of square feet of radiation

	1958	1957	1956
January	1,343	1,712	2,018
February	1,229	1,797	2,236
March	1,890	1,803	1,802
April	1,361	1,723	1,900
May	1,135	1,507	1,577
June	1,440	2,230	1,618
July	1,457	1,769	1,959
August	2,095	2,123	2,996
September	....	2,551	3,089
October	....	2,651	3,719
November	....	1,995	2,589
December	....	1,277	1,756

YEARLY TOTALS†

1957	24,892	1955	30,863
1956	29,567	1954	28,941

†Monthly figures do not add up to yearly totals because of yearend revision.
U. S. Bureau of the Census.

Plumbing Fixtures

Shipments—Value in Thousands

VITREOUS CHINA AND GLAZED EARTHENWARE

Qtr	1958	1957	1956	1955
1st	$30,676	$32,124	$38,300	$31,102
2nd	30,649	34,173	38,760	34,415
3rd	32,205	34,029	36,764	35,810
4th	.....	27,714	33,027	36,350
Totals	.....	$128,010	$146,851	$137,677

1954	$109,836	1952	$85,230
1953	91,047	1951	108,243

ALL METAL—EXCLUSIVE OF FITTINGS

Qtr	1958	1957	1956	1955
1st	$40,984	$44,663	$50,857	$55,840
2nd	45,151	40,154	51,328	59,758
3rd	48,409	43,985	54,423	60,038
4th	.....	38,578	42,087	49,714
Totals	.....	$175,380	$198,695	$225,350

1954	$196,704	1952	$176,136
1953	186,690	1951	202,530

CAST IRON

Qtr	1958	1957	1956	1955
1st	$26,928	$30,040	$33,881	$37,517
2nd	28,983	31,803	34,175	39,397
3rd	30,757	27,197	35,511	39,403
4th	.....	25,373	27,392	32,200
Totals	.....	$114,413	$130,959	$148,517

1954	$130,821	1952	$119,654
1953	125,239	1951	141,920

STEEL

Qtr	1958	1957	1956	1955
1st	$13,929	$14,402	$16,763	$18,082
2nd	16,062	16,141	16,886	20,140
3rd	17,532	16,593	18,667	20,421
4th	.....	13,011	14,490	17,353
Totals	.....	$60,147	$66,806	$75,996

1954	$65,371	1952	$55,586
1953	60,587	1951	59,404

ALUMINUM, MONEL & OTHER METAL

Qtr	1958	1957	1956	1955
1st	$127	$221	$213	$241
2nd	106	210	267	221
3rd	120	195	245	214
4th	...	194	205	161
Totals	...	$820	$930	$837

1954	$512	1952	$896
1953	864	1951	1,206

U. S. Bureau of the Census.

Electric Lamps (Bulbs)

Manufacturers' Shipments
Value in Thousands of Dollars

	Domestic	Export	Totals
1958 (9 Mo.)	$269,628	$10,488	$280,116
1st Qtr	91,450	3,915	95,365
2nd Qtr	80,445	3,514	83,959
3rd Qtr	97,733	3,059	100,792
4th Qtr	.....	.....	.....
1957	378,240	18,132	396,372
1956	357,434	15,796	373,230
1955	323,172	14,254	337,426
1954	290,618	11,439	302,059
1953	277,529	11,819	289,348
1952	229,899	8,206	238,105
1951	252,465	11,670	264,135

PRODUCTION

Thousands of Lamps

1958 (9 Mo.)	1,685,967	1954	2,246,746
1957	2,626,724	1953	2,247,700
1956	2,717,945	1952	n.a.
1955	2,484,613	1951	2,341,154

n.a.=not available.
U. S. Bureau of the Census.

Transistor Sales

	1958 Units, Thousands	1958 Value, Thousands of Dollars	1957 Units, Thousands	1957 Value, Thousands of Dollars
Jan.	2,955	6,704	1,436	4,119
Feb.	3,107	6,807	1,785	5,172
Mar.	2,977	6,795	1,904	5,321
Apr.	2,856	7,026	1,774	4,880
May	2,999	7,251	2,055	5,636
June	3,558	8,232	2,245	6,121
July	2,632	6,599	1,703	4,216
Aug.	4,227	9,976	2,709	6,598
Sept.	5,076	10,811	3,231	6,993
Oct.	....	....	3,544	7,075
Nov.	....	....	3,579	6,989
Dec.	....	....	2,773	6,619

YEARLY TOTALS

	Units	Value
1957	28,738,000	$69,739,000
1956	12,840,000	37,352,000
1955	3,646,802	9,860,062
1954	1,317,327	5,122,266

Electronic Industries Association.

Receiving Tubes

Manufacturers' Sales

	Number	Value
1958 (10 Mo.)	333,258,000	$286,951,000
January	26,805,000	23,264,000
February	29,661,000	25,650,000
March	28,548,000	25,716,000
April	32,582,000	28,788,000
May	36,510,000	31,406,000
June	36,270,000	31,445,000
July	30,795,000	26,927,000
August	30,456,000	25,442,000
September	40,061,000	33,951,000
October	41,540,000	34,362,000
November	.....	.....
December	.....	.....
1957	456,424,000	$384,402,000
1956	464,186,000	374,186,000

Electronic Industries Association.

Television Picture Tubes

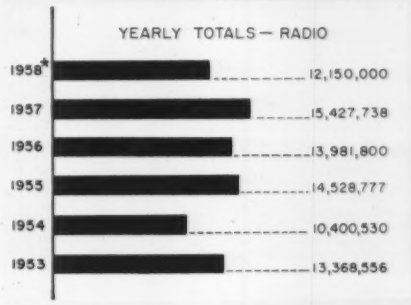
Manufacturers' Sales

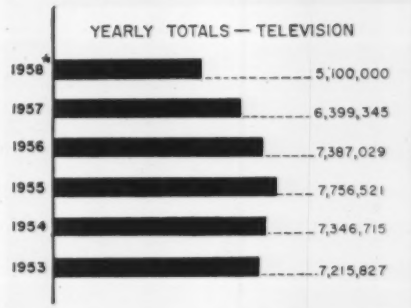
	Number	Value
1958 (10 Mo.)	6,801,706	$135,584,241
January	621,910	12,341,927
February	556,136	11,210,527
March	634,779	12,643,404
April	590,357	11,591,733
May	560,559	11,237,147
June	725,846	14,203,381
July	549,817	11,109,048
August	713,458	14,190,878
September	891,803	17,704,289
October	957,041	19,351,907
November	.....	.....
December	.....	.....
1957	9,721,008	$183,231,337
1956	10,987,021	196,220,240

Electronic Industries Association.

RADIO AND TELEVISION RECEIVERS

Number Produced





RADIOS

	Automobile	Other	Totals
1958			
10 Mo.	2,679,618	6,805,060	9,484,678
January	349,679	676,848	1,026,527
February	268,445	608,446	876,891
March	234,911	696,430	931,341
April	190,435	506,872	697,307
May	185,616	469,187	654,803
June	235,433	538,991	774,424
July	186,379	435,162	621,541
August	242,915	785,937	1,028,852
September	489,738	1,077,397	1,567,135
October	296,067	1,009,790	1,305,857
November	.....	.....	.....
December	.....	.....	.....

YEARLY TOTALS

	Units	Value (Manufacturers')
1957	15,427,738	$373,975,000
1956	13,981,800	298,372,000
1955	14,528,777	291,157,000
1954	10,400,530	228,812,000
1953	13,368,556	297,985,000
1952	10,934,872	249,847,000

TELEVISION

	1958	1957	1956
January	433,983	450,190	588,347
February	370,413	464,697	576,282
March	416,903	559,842	680,003
April	302,559	361,246	549,632
May	266,982	342,386	467,913
June	377,090	543,778	553,025
July	274,999	360,660	336,931
August	507,526	673,734	612,927
September	621,734	832,631	894,211
October	495,617	661,994	820,781
November	.....	574,646	679,993
December	.....	573,541	626,984

YEARLY TOTALS

	Units	Value (Manufacturers')
1957	6,399,345	$832,747,000
1956	7,387,029	938,598,000
1955	7,756,521	1,071,020,000
1954	7,346,715	1,028,540,000
1953	7,215,827	1,230,298,000
1952	6,096,280	1,049,000,000

*Estimated.
Electronic Industries Association.

Appliances

METALWORKING FACTS AND FIGURES

Washer-Dryers

Factory Sales—Units

	1958	1957	1956
Jan.	13,442	18,645	n.a.
Feb.	12,396	20,492	n.a.
Mar.	12,317	21,637	n.a.
Apr.	11,847	12,665	n.a.
May	7,780	9,512	n.a.
June	7,069	9,019	n.a.
July	7,829	10,145	n.a.
Aug.	13,659	11,980	9,995
Sept.	19,806	20,158	9,056
Oct.	22,843	19,227	10,360
Nov.	.....	13,762	12,481
Dec.	.....	12,026	11,601
Totals	.....	179,268	102,406*

*Includes 48,913 units sold from January through July. National Electrical Manufacturers Association.

Electric Freezers

(Home and Farm)
Total Industry Sales—Units

	1958	1957	1956
Jan.	63,000	68,400	77,800
Feb.	66,500	73,400	83,700
Mar.	75,400	81,400	85,300
Apr.	79,300	70,900	95,300
May	87,900	82,300	83,000
June	121,500	94,800	93,000
July	119,700	109,100	105,000
Aug.	101,400	86,000	93,800
Sept.	121,200	79,000	79,100
Oct.	108,100	71,500	67,200
Nov.	.....	60,800	54,400
Dec.	.....	47,400	57,400

YEARLY TOTALS

1957	925,000	1953	1,090,000
1956	975,000	1952	1,140,000
1955	1,100,000	1951	1,050,000
1954	990,000	1950	890,000

National Electrical Manufacturers Association.

Standard Vacuum Cleaners

Sales Billed—Units

	1958	1957	1956
Jan.	265,489	276,738	302,203
Feb.	225,631	300,887	286,386
Mar.	291,418	312,746	395,686
Apr.	247,293	281,627	352,873
May	218,766	231,246	326,008
June	253,127	207,286	248,326
July	263,778	218,276	259,774
Aug.	280,226	241,218	276,932
Sept.	299,618	302,869	320,278
Oct.	339,127	328,655	371,998
Nov.	.....	251,123	300,381
Dec.	.....	237,501	281,025

YEARLY TOTALS

1957	3,190,172	1954	2,658,136
1956	3,721,870	1953	2,777,756
1955	3,270,441	1952	2,841,803

Vacuum Cleaner Manufacturers' Association.

Coal and Wood Cooking Stoves

Shipments—Units

	1958	1957	1956	1955
Jan.	3,674	4,178	5,084	5,564
Feb.	3,003	4,716	5,039	5,527
Mar.	3,493	4,000	4,958	6,063
Apr.	2,764	4,716	4,572	4,283
May	2,924	4,669	4,159	4,107
June	3,648	4,757	4,154	4,817
July	3,668	3,908	4,065	5,367
Aug.	4,489	4,497	7,183	6,460
Sept.	5,659	5,451	5,789	7,752
Oct.	.....	6,227	6,536	6,834
Nov.	.....	3,328	5,537	7,053
Dec.	.....	2,350	4,387	6,476

YEARLY TOTALS†

1957	50,281	1955	69,851	1953	83,062
1956	58,447	1954	66,487	1952	105,486

†Monthly figures do not add up to yearly totals because of yearend revisions.
U. S. Bureau of the Census.

Electric Dishwashers

Total Industry Sales—Units

	1958	1957	1956
Jan.	30,400	37,200	36,200
Feb.	29,200	36,700	36,400
Mar.	32,900	33,100	41,500
Apr.	26,700	26,000	38,000
May	30,600	24,800	42,100
June	34,300	33,500	34,700
July	33,100	27,400	31,200
Aug.	28,400	36,700	20,400
Sept.	42,800	36,700	34,800
Oct.	38,800	35,200	22,500
Nov.	.....	32,800	30,900
Dec.	.....	29,900	31,300

YEARLY TOTALS

1957	390,000	1953	180,000
1956	400,000	1952	175,000
1955	295,000	1951	260,000
1954	215,000	1950	230,000

National Electrical Manufacturers Association.

Oil Cooking Stoves

(Kerosine, Gasoline, and Fuel Oil)
Shipments—Units

	1958	1957	1956	1955
Jan.	6,886	5,934	8,835	9,123
Feb.	8,994	6,950	9,473	8,343
Mar.	9,577	11,027	8,016	8,902
Apr.	4,361	6,954	8,733	9,920
May	3,527	7,649	7,283	7,840
June	5,246	5,656	6,206	7,892
July	4,980	5,880	4,815	5,427
Aug.	6,878	9,278	11,839	12,471
Sept.	6,685	7,094	7,673	12,182
Oct.	.....	6,807	8,512	12,039
Nov.	.....	6,283	5,858	8,268
Dec.	.....	4,982	5,352	8,062

YEARLY TOTALS†

1957	84,494	1955	108,257	1953	117,606
1956	88,143	1954	109,210	1952	119,928

†Except for 1957, figures do not add up to yearly totals because of yearend revisions.
U. S. Bureau of the Census.

Miscellaneous Home Equipment

Electric Toasters

Sales Billed—Units

AUTOMATIC

1958 (6 Mo.)	606,364	1954	2,156,406
1957	2,428,033	1953	2,304,851
1956	2,590,485	1952	1,999,430
1955	2,345,816	1951	2,630,096

NONAUTOMATIC

1958 (6 Mo.)	63,536	1954	234,662
1957	179,985	1953	300,800
1956	200,241	1952	40,173
1955	194,168	1951	92,293

National Electrical Manufacturers Association.

Standard-Size Ironers†

Factory Sales—Units

1958*	30,000	1954	86,205
1957	43,510	1953	154,466
1956	58,493	1952	202,143
1955	81,910	1951	269,946

*Estimated by STEEL.
†Includes both domestic and export sales for 1957 and 1958. American Home Laundry Manufacturers Association.

Electric Flat Irons

Sales Billed—Units

1958 (6 Mo.)	1,325,299	1954	5,441,229
1957	5,215,041	1953	6,444,730
1956	6,170,711	1952	5,255,044
1955	5,876,004	1951	6,012,727

National Electrical Manufacturers Association.

Electric Grills and Waffle Irons

Sales Billed—Units

Sandwich Grills & Griddles, Waffle Irons, & Combination Grills & Waffle Irons

1958 (6 Mo.)	174,860	1954	699,565
1957	659,183	1953	1,042,381
1956	699,268	1952	856,015
1955	757,870	1951	923,395

National Electrical Manufacturers Association.

Electric Coffeemakers, Pots & Urns

Vacuum (glass & metal) and Percolators

Sales Billed—Units

1958 (6 Mo.)	1,166,066	1954	2,789,554
1957	2,918,718	1953	3,258,394
1956	3,453,684	1952	1,265,397
1955	2,866,423	1951	1,031,756

National Electrical Manufacturers Association.

Electric Disc Stoves and Hot Plates

(1650 Watts or Less)
Sales Billed—Units

1958 (6 Mo.)	125,364	1954	377,119
1957	333,906	1953	532,056
1956	352,881	1952	336,838
1955	388,233	1951	352,758

National Electrical Manufacturers Association.

Portable Electric Air Heaters

Sales Billed—Units

CONVECTOR AND RADIANT

1958 (6 Mo.)	16,186	1954	129,330
1957	105,179	1953	146,975
1956	117,113	1952	109,388
1955	118,509	1951	161,115

FAN FORCED AND FAN AND HEATER COMBINATION

1958 (6 Mo.)	100,918	1954	545,760
1957	616,692	1953	573,306
1956	729,543	1952	377,120
1955	646,790	1951	349,337

National Electrical Manufacturers Association.

Electric Fans*

Domestic Sales—Units

1958 (9 Mo.)	2,065,200	1955	2,832,715
1957	2,677,900	1954	3,994,276
1956	3,745,997	1953	2,692,502

*Year of record runs from Sept. 1 of preceding year to Aug. 31. National Electrical Manufacturers Association.

Deep Fat Fryers

Sales Billed—Units

1958 (6 Mo.)	10,812	1955	184,036
1957	68,133	1954	325,358
1956	101,266	1953	433,737

National Electrical Manufacturers Association.

Electric Corn Poppers

Sales Billed—Units

1958 (6 Mo.)	99,568	1956	516,590
1957	431,994	1955	492,909
		1954	525,198

National Electrical Manufacturers Association.

Electric Skillets

Sales Billed—Units

1958 (6 Mo.)	385,243	1957	1,799,647
		1956	2,027,019

National Electrical Manufacturers Association.

Steel Kitchen Cabinets

(Including steel cabinet sink units)
(Factory Sales)

	Units	Retail Value
1957	2,490,000	$150,120,000
1956	3,641,000	188,395,000
1955	4,046,000	209,328,000
1954	3,372,000	174,440,000
1953	3,441,000	178,000,000
1952	2,970,000	154,000,000
1951	2,871,000	128,850,500

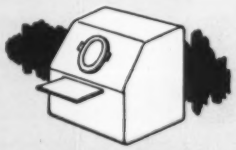
Steel Kitchen Cabinet Manufacturers Assn. Inc.

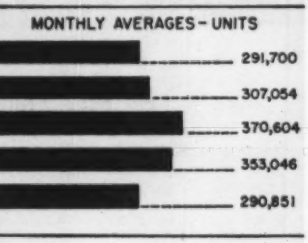
Water Softeners†

Factory Shipments

	Units	Value
1957	206,388	$22,643,000
1956	223,597	22,262,000

†Farm and household.
U. S. Bureau of the Census.





WASHERS†

Sales Billed—Units

	1958	1957	1956
Jan.	244,840	340,913	393,717
Feb.	268,143	331,799	405,631
Mar.	287,884	294,941	405,744
Apr.	224,896	238,423	324,238
May	262,999	262,430	315,249
June	288,831	289,245	340,235
July	277,287	340,915	380,172
Aug.	326,785	334,348	373,925
Sept.	423,073	392,733	402,631
Oct.	404,056	377,621	449,409
Nov.	.....	267,796	357,935
Dec.	.....	213,485	298,368

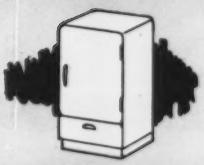
YEARLY TOTALS

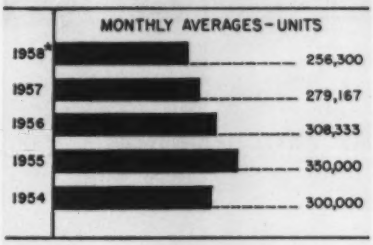
1957	3,684,649	1954	3,490,212
1956‡	4,447,254	1953	3,460,396
1955	4,236,555	1952	3,174,588

*Based on estimate made by American Home Laundry Manufacturers' Association.

†Includes both domestic and export sales for 1957 and 1958.

‡Includes 102,406 washer-dryers, also reported as dryers.





ELECTRIC REFRIGERATORS

Total Industry Sales—Units

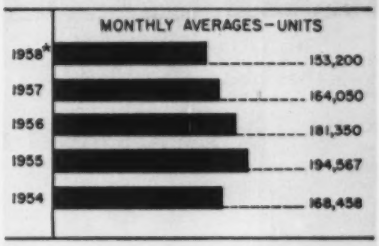
	1958	1957	1956
Jan.	206,100	305,400	308,900
Feb.	227,800	298,700	316,000
Mar.	261,100	309,300	403,500
Apr.	210,800	281,600	353,300
May	262,900	303,700	346,800
June	316,300	305,100	354,400
July	279,700	318,000	351,000
Aug.	246 900	240,500	307,600
Sept.	296,200	265,200	277,300
Oct.	277,500	261,500	212,200
Nov.	.....	246,400	211,600
Dec.	.....	214,600	257,400

YEARLY TOTALS

1957	3,350,000	1953	3,650,000
1956	3,700,000	1952	3,570,000
1955	4,200,000	1951	4,075,000
1954	3,600,000	1950	6,200,000

*Estimated.

National Electrical Manufacturers Association.



HOUSEHOLD GAS RANGES†

Shipments—Units

	1958	1957	1956
Jan.	128,400	149,600	163,500
Feb.	134,500	161,600	190,200
Mar.	149,400	179,400	194,300
Apr.	148,300	168,800	176,300
May	147,300	156,200	179,400
June	155,800	155,300	185,100
July	129,300	137,400	158,800
Aug.	157,600	182,600	203,200
Sept.	182,700	192,100	206,400
Oct.	215,400	195,500	219,100
Nov.	.....	154,300	161,200
Dec.	.....	135,800	138,700

YEARLY TOTALS

1957	1,968,600	1954	2,021,500
1956	2,176,200	1953	2,176,500
1955	2,334,800	1952	2,188,900

*Estimated.

†Figures prior to 1955 include free-standing ranges only.

Gas Appliance Manufacturers Association Inc.

Electric Clothes Dryers†

Factory Sales—Units

	1958	1957	1956‡
Jan.	70,475	108,869	123,779
Feb.	58,630	79,207	106,015
Mar.	51,368	57,047	83,552
Apr.	27,875	28,704	49,786
May	28,515	21,474	40,316
June	34,913	33,161	41,724
July	54,557	52,035	92,785
Aug.	72,350	77,662	101,166
Sept.	110,008	115,126	136,628
Oct.	115,133	126,799	147,275
Nov.	.....	95,640	123,283
Dec.	.....	85,304	121,036
Totals	.....	881,028	1,167,345

†Includes both domestic and export sales for 1957 and 1958.

‡Includes washer-dryers also reported as washers.

American Home Laundry Manufacturers' Association.

Gas Water Heaters

Shipments—Units

	1958	1957	1956
Jan.	235,400	214,900	239,000
Feb.	216,300	208,200	259,200
Mar.	221,600	226,600	267,500
Apr.	221,900	238,200	241,200
May	210,000	233,400	244,300
June	231,000	211,700	251,500
July	221,400	192,500	231,900
Aug.	215,500	210,300	243,500
Sept.	228,800	215,500	218,100
Oct.	256,300	234,700	224,700
Nov.	.....	173,500	184,400
Dec.	.....	172,800	156,800

YEARLY TOTALS

1957	2,532,300	1954	2,360,500
1956	2,762,100	1953	2,182,700
1955	2,748,200	1952	1,910,400

Gas Appliance Manufacturers Association Inc.

Gas Clothes Dryers†

Factory Sales—Units

	1958	1957	1956‡
Jan.	30,318	36,759	42,464
Feb.	21,053	37,885	42,507
Mar.	20,155	27,632	29,479
Apr.	10,600	15,301	15,137
May	13,383	11,372	15,014
June	19,260	14,535	16,717
July	20,956	18,405	24,763
Aug.	37,483	39,393	43,371
Sept.	48,725	51,347	56,096
Oct.	65,272	60,700	59,654
Nov.	.....	47,515	47,246
Dec.	.....	33,981	41,917
Totals	.....	394,825	434,365

†Includes both domestic and export sales for 1957 and 1958.

‡Includes washer-dryers also reported as washers.

American Home Laundry Manufacturers' Association.

Electric Water Heaters

Total Industry Sales of Storage Tank Type—Units

	1958	1957	1956
January	61,700	56,300	72,300
February	58,000	62,600	79,400
March	68,600	66,200	79,900
April	68 500	65,600	80,500
May	66,100	71,500	79,500
June	74,600	70,500	82,100
July	79,000	64,000	75,300
August	61,000	60,500	68,300
September	74,500	69,800	75,400
October	78,000	79,400	72,400
November	.....	73,100	54,400
December	.....	60,500	50,500

YEARLY TOTALS

1957	800,000	1953	780,000
1956	870,000	1952	720,000
1955	900 000	1951	845,000
1954	806,000	1950	990,000

National Electrical Manufacturers Association.

Household Electric Ranges†

Total Industry Sales—Units

	1958	1957	1956
Jan.	109,000	144,500	143,600
Feb.	108,700	127,700	161,400
Mar.	117 900	139,400	163,100
Apr.	95,600	107,200	157,500
May	96,000	93,600	128,400
June	116,800	102,300	129,800
July	98,500	88,700	121,500
Aug.	81,400	85,800	97,500
Sept.	122,200	124,800	129,300
Oct.	135,700	120,400	116,200
Nov.	.....	116,800	110,200
Dec.	.....	113,800	126,500

YEARLY TOTALS

1957	1,365,000	1952	1,060,000
1956	1,585,000	1951	1,400,000
1955	1,600,000	1950	1,830,000
1954	1,350,000	1949	1,056,000
1953	1,250,000	1948	1,600,000

†Figures prior to 1956 include free-standing ranges only.

National Electrical Manufacturers Association.

Food Waste Disposers

(Plumbed-in Only)

Total Industry Sales—Units

	1958	1957	1956
Jan.	40,800	49,800	63,900
Feb.	46,400	43,600	47,400
Mar.	47,800	43,800	52,900
Apr.	40 000	38,400	56,100
May	46,400	35,900	56,400
June	61,300	44,700	46,400
July	49,100	40,100	46,600
Aug.	47,500	47,300	39,400
Sept.	56,200	53,500	57,400
Oct.	53,800	49,900	42,300
Nov.	.....	47,700	37,400
Dec.	.....	55,300	43,800

YEARLY TOTALS

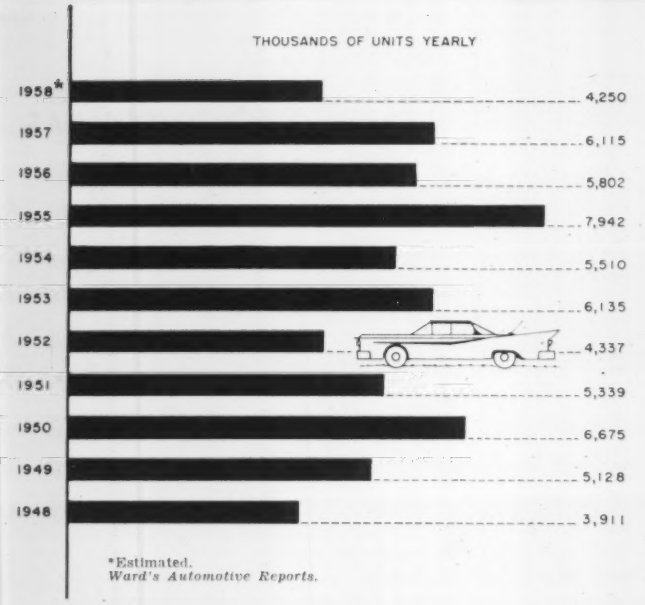
1957	550,000	1954	410,000
1956	590,000	1953	325,000
1955	520,000	1952	260,000

National Electrical Manufacturers Association.

Transportation

METALWORKING FACTS AND FIGURES

U. S. PASSENGER CAR PRODUCTION



*Estimated.
Ward's Automotive Reports.

U. S. Auto Production

	Passenger Cars	Trucks	Totals
1958*	4,249,964	871,825	5,121,789
Jan.	489,357	81,802	571,159
Feb.	392,112	72,891	465,003
Mar.	357,049	71,385	428,434
Apr.	316,503	74,531	391,034
May	349,474	74,331	423,805
June	337,355	70,003	407,358
July	321,069	67,390	388,459
Aug.	180,324	49,566	229,890
Sept.	130,426	47,543	177,969
Oct.	261,696	69,828	331,524
Nov.	514,099	94,555	608,654
Dec.*	600,500	98,000	698,500
1957	6,115,458	1,085,932	7,201,390
Jan.	641,591	94,040	735,631
Feb.	570,650	92,571	663,221
Mar.	578,356	89,716	668,072
Apr.	548,656	104,384	653,040
May	531,413	101,221	632,634
June	500,266	92,601	592,867
July	495,625	94,997	590,622
Aug.	524,363	88,509	612,872
Sept.	283,862	59,989	343,851
Oct.	327,362	89,313	416,675
Nov.	578,600	91,988	670,588
Dec.	534,714	86,603	621,317
1956	5,801,864	1,104,325	6,906,189
1955	7,942,132	1,246,442	9,188,574
1954	5,509,550	1,022,609	6,532,159
1953	6,134,534	1,203,835	7,338,369
1952	4,337,481	1,218,045	5,555,526
1951	5,338,820	1,412,149	6,750,969
1950	6,674,933	1,344,227	8,019,160
1949	5,128,187	1,132,138	6,260,325
1948	3,910,700	1,369,472	5,280,172

Canadian Auto Production

	Passenger Cars	Trucks	Totals
1958*	293,386	58,276	351,662
Jan.	28,235	4,862	33,097
Feb.	26,430	4,712	31,142
Mar.	29,172	5,194	34,366
Apr.	32,280	5,441	37,721
May	35,688	5,760	41,448
June	30,708	5,662	36,370
July	21,782	5,313	27,095
Aug.	5,860	3,342	9,202
Sept.	8,007	3,527	11,534
Oct.	16,691	3,810	20,501
Nov.	28,533	5,453	33,986
Dec.*	30,000	5,200	35,200
1957	339,596	71,111	410,707
Jan.	38,184	6,796	44,980
Feb.	29,609	6,693	36,302
Mar.	38,045	6,871	44,916
Apr.	40,505	8,309	48,814
May	39,772	8,890	48,662
June	32,095	7,014	39,109
July	29,603	5,731	35,334
Aug.	15,041	3,869	18,910
Sept.	7,239	2,827	10,066
Oct.	14,973	3,999	18,972
Nov.	32,005	5,891	37,896
Dec.	22,525	4,221	26,746
1956	373,854	101,221	475,075
1955	377,618	74,745	452,363
1954	285,595	66,395	351,990
1953	366,535	117,260	483,795
1952	284,622	149,107	433,729
1951	281,634	133,160	414,794
1950	282,655	105,425	388,080
1949	192,981	97,955	290,936
1948	167,841	95,819	263,660

Ward's Automotive Reports. *Estimated.

Trucktrailers

Shipments

	1958 Units	1958 Value, Thousands of Dollars	1957 Units	1957 Value, Thousands of Dollars
Jan.	3,397	18,740	4,915	25,708
Feb.	3,024	16,622	5,136	27,244
Mar.	3,468	18,977	5,382	27,767
Apr.	3,559	19,111	5,411	29,179
May	3,882	20,561	5,628	29,088
June	3,766	19,974	4,820	25,651
July	3,880	20,912	4,374	22,733
Aug.	4,219	22,792	5,044	26,493
Sept.	4,442	24,270	4,475	24,367
Oct.			4,924	26,173
Nov.			4,024	20,974
Dec.			3,557	18,974

YEARLY TOTALS

	Units	Value
1957	57,690	$304,351,000
1956	67,824	329,230,000
1955	76,468	371,413,000
1954	54,537	245,227,000
1953	96,699	294,849,000

U. S. Bureau of the Census.

Autos, Trucks Scrapped

	Passenger Cars	Trucks, Buses	Totals
1957*	4,250,000	625,000	4,875,000
1956	4,327,000	621,000	4,948,000
1955	3,773,000	619,000	4,392,000
1954	3,840,000	513,000	4,353,000
1953	3,466,000	588,000	4,054,000
1952	3,163,000	604,000	3,767,000
1951	3,122,000	652,000	3,774,000
1950	2,598,000	636,000	3,234,000
1949	2,616,000	535,000	3,151,000
1948	1,780,000	495,000	2,275,000
1947	1,374,000	437,000	1,811,000
1946	590,000	219,000	809,000

*Estimated.
Automobile Manufacturers Association.

Auto Imports

Passenger Cars—Units

	1958	1957	1956
Jan.	36,074	15,877	7,829
Feb.	28,547	14,685	7,013
Mar.	33,210	21,282	6,767
Apr.	34,716	21,251	9,356
May	34,262	20,381	8,486
June	28,026	21,160	7,640
July	42,285	22,471	9,149
Aug.	34,198	23,255	7,285
Sept.	.....	18,353	8,151
Oct.	.....	25,609	10,303
Nov.	.....	25,382	12,220
Dec.	.....	29,637	13,456

YEARLY TOTALS

1957	259,343	1954	34,555
1956	107,675	1953	27,121
1955	57,115	1952	33,312

Ward's Automotive Reports.

Auto Replacement Parts

Wholesale Value in Thousands

1957	$2,070,000	1945	$1,037,800
1956	1,827,000	1944	789,200
1955	1,805,000	1943	567,710
1954	1,683,000	1942	471,957
1953	1,892,400	1941	718,212
1952	2,164,300	1940	553,004
1951	2,399,400	1939	460,408
1950	1,881,700	1938	360,893
1949	1,809,900	1937	461,775
1948	2,451,500	1936	454,110
1947	2,309,200	1935	373,159
1946	1,750,200	1934	299,880

Automobile Manufacturers Association.

Auto Exports

Passenger Cars—Units

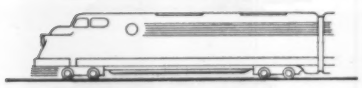
1957	160,632	1953	186,262
1956	192,708	1952	167,048
1955	254,336	1951	246,965
1954	206,544	1950	152,925

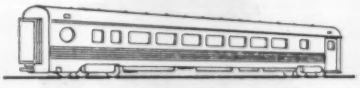
Ward's Automotive Reports.

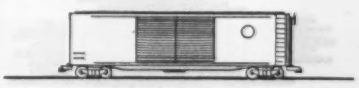
Bicycles Shipped

1958*	2,000,000	1953	2,000,000
1957	1,900,000	1952	1,910,000
1956	1,739,710	1951	1,800,000
1955	1,729,300	1950	1,950,000
1954	1,500,000	1949	1,600,000

*Estimated.







New Locomotive Units Put in Service by Class 1 Railroads

	1958	1957	1956	1955	1954
Jan.	120	117	126	121	159
Feb.	50	127	118	100	80
Mar.	67	133	155	85	182
Apr.	...	114	136	107	137
May	...	119	126	103	130
June	74*	125	124	83	100
July	...	112	120	71	54
Aug.	...	73	127	31	36
Sept.	27*	99	93	85	75
Oct.	...	56	96	108	33
Nov.	...	160	122	131	37
Dec.	...	81	110	157	89
Totals	...	1,316	1,453	1,182	1,112

YEARLY TOTALS

1953	2,110	1951	3,459
1952	3,065	1950	2,396

*Quarterly totals.
Association of American Railroads.

Buses

Shipments from U. S. Factories

	1958	1957	1956	1955
Jan.	327	269	253	190
Feb.	308	238	278	176
Mar.	342	341	434	325
Apr.	344	506	371	519
May	241	462	362	313
June	91	389	503	309
July	358	309	307	296
Aug.	265	315	429	434
Sept.	216	243	368	223
Oct.	...	233	298	469
Nov.	...	241	233	359
Dec.	...	287	228	410
Totals	...	3,833	4,064	4,023

YEARLY TOTALS

1954	4,118	1949	5,511
1953	4,057	1948	12,299
1952	5,375	1947	19,110
1951	9,460	1946	10,188
1950	4,908	1945	9,500

Automobile Manufacturers Association.

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Buses	Totals
1958*	0	461	0	1,900	2,361
1957	0	469	0	1,946	2,415
1956	0	376	0	2,759	3,135
1955	0	288	43	2,098	2,429
1954	0	260	0	2,225	2,485
1953	0	0	0	2,246	2,246
1952	19	0	224	1,749	1,992
1951	56	140	600	4,552	5,348
1950	4	199	179	2,668	3,050
1949	273	415	680	3,358	4,726
1948	478	248	1,430	7,009	9,165
1947	626	2	955	12,029	13,612

*Estimated.
American Transit Association.

Batteries Shipped

Automotive Replacement Only—Thousands

	1958	1957	1956	1955	1954	1953
Jan.	2,004	2,638	2,058	1,518	1,836	1,571
Feb.	1,803	1,961	1,310	1,691	1,461	1,162
Mar.	1,577	1,254	1,348	1,356	1,226	1,202
Apr.	1,242	1,178	1,368	1,315	1,180	1,245
May	1,454	1,605	1,761	1,614	1,429	1,455
June	1,773	1,878	1,807	1,842	1,883	2,004
July	2,101	2,469	2,178	2,078	2,350	2,528
Aug.	2,333	2,856	2,571	2,852	2,548	2,707
Sept.	2,701	2,688	2,711	3,120	2,800	2,852
Oct.	....	3,042	3,015	3,120	2,739	2,825
Nov.	....	2,359	2,592	2,697	2,475	2,173
Dec.	....	2,015	2,265	2,625	1,844	1,890
Totals	....	25,943	25,014	25,828	23,771	23,614

YEARLY TOTALS

1952	22,453	1951	22,219

U. S. Department of Commerce.

Railroad Passenger Cars

Shipments—Number of Cars

	1958	1957	1956	1955	1954
Jan.	39	9	42	40	29
Feb.	18	23	53	36	40
Mar.	10	6	54	45	59
Apr.	0	11	25	36	64
May	2	41	53	49	41
June	16	65	40	55	44
July	20	27	29	39	65
Aug.	0	43	48	45	52
Sept.	3	187	46	355	42
Oct.	..	387	26	206	38
Nov.	..	5	5	38	54
Dec.	..	37	9	39	57

MONTHLY AVERAGES

1957	70	1951	23	1945	77
1956	34	1950	80	1944	83
1955	82	1949	83	1943	59
1954	49	1948	69	1942	33
1953	33	1947	58	1941	30
1952	11	1946	114	1940	23

Domestic Orders†—Number of Cars

	1958	1957	1956	1955	1954
Jan.	22	7	75	40	3
Feb.	5	15	6	0	43
Mar.	0	10	1	273	5
Apr.	0	0	5	5	0
May	0	1	0	152	0
June	0	12	53	23	1
July	30	10	0	28	65
Aug.	0	0	0	2	0
Sept.	..	0	70	6	177
Oct.	..	23	9	45	11
Nov.	..	0	0	4	5
Dec.	..	0	50	500	300
Totals	..	78	269	1,078	610

YEARLY TOTALS

1953	164	1950	102
1952	520	1949	109
1951	261	1948	506

†Including express refrigerator cars.
American Railway Car Institute.

Freight Cars Ordered

Domestic

	Car-builders	Railroad Shops	Total No. Cars
1958			
10 Mo.	5,765	1,591	7,356
Jan.	375	26	401
Feb.	208	79	287
Mar.	192	1	193
Apr.	178	100	278
May	1,319	51	1,370
June	187	130	317
July	376	0	376
Aug.	771	1,002	1,773
Sept.	1,538	42	1,580
Oct.	621	160	781
Nov.	....	....	....
Dec.	....	....	....
1957	22,624	19,017	41,641
Jan.	1,637	4,572	6,209
Feb.	1,845	2,187	4,032
Mar.	817	2,382	3,199
Apr.	6,404	49	6,453
May	1,892	1,354	3,246
June	1,978	2,751	4,729
July	782	186	968
Aug.	1,068	1,860	2,928
Sept.	1,658	1,504	3,162
Oct.	522	1,680	2,202
Nov.	957	113	1,070
Dec.	3,064	379	3,443

YEARLY TOTALS

1956	31,026	7,983	39,009
1955	83,344	79,008	162,352
1954	11,240	7,736	21,976
1953	23,429	10,136	33,565
1952	22,672	11,697	34,369

American Railway Car Institute.

FREIGHT CAR SHIPMENTS

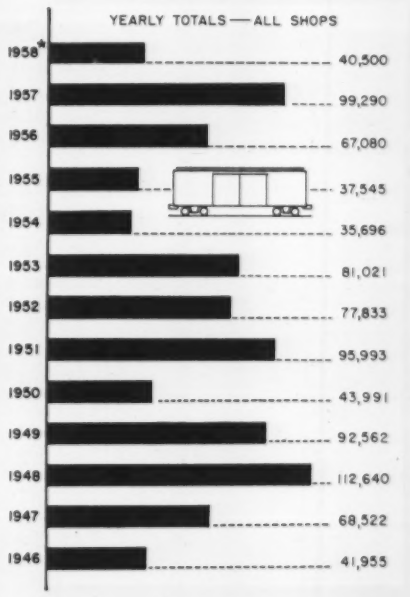
Domestic—Number of Cars

	Car-builders	Railroad Shops	Total No. Cars
1958			
10 Mo.	23,644	13,887	37,531
Jan.	4,836	2,383	7,219
Feb.	3,526	1,790	5,316
Mar.	4,426	1,480	5,906
Apr.	3,630	1,533	5,163
May	2,164	1,370	3,534
June	1,179	1,228	2,407
July	1,080	1,033	2,113
Aug.	1,276	875	2,151
Sept.	988	1,143	2,131
Oct.	539	1,052	1,591
Nov.	....	....	....
Dec.	....	....	....
1957	56,398	42,892	99,290
Jan.	4,686	3,717	8,403
Feb.	4,567	3,608	8,184
Mar.	5,613	4,161	9,774
Apr.	5,253	3,763	9,016
May	5,183	3,700	8,883
June	4,717	3,748	8,465
July	4,685	3,061	7,746
Aug.	4,587	4,171	8,758
Sept.	4,897	3,553	8,450
Oct.	4,817	3,478	8,295
Nov.	3,915	3,227	7,142
Dec.	3,469	2,705	6,174

YEARLY TOTALS

1956	42,502	24,578	67,080
1955	23,786	13,759	37,545
1954	22,318	13,378	35,696
1953	53,298	27,723	81,021
1952	53,587	24,246	77,833

American Railway Car Institute.



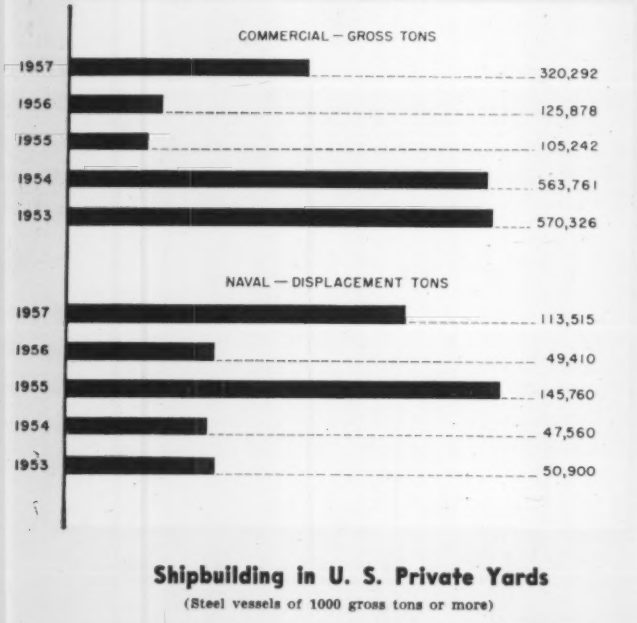
*Estimated.

Transportation

METALWORKING FACTS AND FIGURES

SHIPS DELIVERED FROM PRIVATE YARDS

(UNITED STATES)



Shipbuilding in U. S. Private Yards

(Steel vessels of 1000 gross tons or more)

	1957		1956	
COMMERCIAL VESSELS	Number	Tons†	Number	Tons†
Under construction Jan. 1	84	1,854,606	25	312,290
Contracted for during year	35	750,706	68	1,715,406
Totals	119‡	2,605,312‡	93	2,027,696
Launched during year	26	388,637	12	156,440
Delivered during year	23	320,292	9	125,878
Under construction Dec. 31	93	2,171,520	84	1,901,818
NAVAL VESSELS				
Under construction Jan. 1	55	285,745	42	246,650
Contracted for during year	14	100,310	22	86,895
Totals	69	386,055	64	333,545
Launched during year	15	39,455	17	109,730
Delivered during year	23	113,515	9	49,410
Under construction Dec. 31	46	272,540	55	284,135

†Gross tons for commercial vessels and displacement tons for naval vessels.
‡Orders for three ships of 113 500 tons were canceled.
Shipbuilders Council of America.

Civil Aircraft

(Complete airplanes shipped)

	Number		Value (Thousands)	
	1958	1957	1958	1957
January	579	554	$62,311	$48,431
February	510	523	65,046	49,278
March	697	675	35,133	46,465
April	704	657	17 496	57,980
May	622	672	35,113	84,136
June	589	590	25 155	69,497
July	503	525	41,537	70,649
August	471	519	30,766	62,990
September	390	466	24,401	54,911
October	628	474	49,328	45,687
November		516		47,213
December		544		44,856

YEARLY TOTALS

	Number	Value
1957	6,715	$682,093,000
1956	7,208	454,156,030
1955	4,820	271,250,000

U. S. Bureau of the Census.

Engines for Civil Aircraft

(Shipments)

	Number		Value (Thousands)	
	1958	1957	1958	1957
January	1,033	920	$8,883	$12,445
February	1,139	902	9,696	13,596
March	994	1,010	8,174	13,975
April	881	950	8,174	14,388
May	828	1,020	6,176	15,160
June	783	933	5,994	15,636
July	730	801	4,898	12,748
August	693	776	3 420	8,603
September	757	728	3,312	10,150
October	811	921	3,336	13,638
November		878		9,880
December		1,020		12,237

YEARLY TOTALS

	Number	Value
1957	10,859	$152,456
1956	11,499	108,262
1955	7,639	59,147

U. S. Bureau of the Census.

Commercial Ship Construction

Steel self-propelled vessels of 2000 gross tons and over built in private U. S. yards.†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1957	23	326,292	1951	10	147,569
1956	9	125,878	1950	26	415,499
1955	8	105,242	1949	34	538,873
1954	38	563,761	1948	29	164,482
1953	45	570,326	1947	50	286,473
1952	31	397,156	1946	88	672,554

†On Jan. 1, 1958, 93 steel vessels of 1000 gross tons or over aggregating 2,171,520 gross tons were under construction, compared with 84 vessels aggregating 1,901,818 gross tons on Jan. 1, 1957.

TYPES OF VESSELS CONSTRUCTED—1957

(Steel vessels of 1000 gross tons or over)

Type	Number	Gross Tonnage
Tanker	18	308,020
Cargo	2	4,972
Train Ferry	1	2,500
Passenger-Auto Ferry	1	2,300
Drilling Tender	1	2,500
Totals	23	320,292

CONTRACTED FOR IN 1957

(Steel vessels of 1000 gross tons or over)

Type	Number	Gross Tonnage
Tanker	28	664,906
Ore Carrier	3	44,000
Self-Unloader	1	14,500
Geodetic Survey Vessel	1	2,800
Seatrain	1	8,500
Passenger-Cargo	1	16,000
Totals	35	750,706

UNCOMPLETED VESSELS

(Steel vessels of 1000 gross tons or over)
Jan. 1, 1958

Type	Number	Gross Tonnage
Tanker	77	1,962,334
Cargo	1	2,486
Cargo Ship, Dock	1	12,000
Passenger-Cargo	5	82,400
Ore Carrier	5	74,500
Roll-on Roll-off	1	12,000
Seatrain	1	8,500
Self-Unloader	1	14,500
Geodetic Survey Vessel	1	2,800
Totals	93	2,171,520

Naval Shipbuilding

PRIVATE YARDS' NAVAL BACKLOG

Jan. 1, 1958

Type	Number	Displacement Tonnage
Aircraft Carrier	2	115,150
Destroyer	13	29,875
Guided Missile Destroyer	8	26,960
Landing Ship, Tank	4	14,960
Ammunition Ship	3	24,000
Submarine	10	27,695
Guided Missile Cruiser	1	13,000
Frigate	5	20,900
Totals	46	272,540

CONTRACTED FOR IN 1957

Guided Missile Destroyer	8	26,960
Nuclear-Powered Submarine	4	11,400
Attack Aircraft Carrier	1	60,000
Submarine	1	1,950
Totals	14	100,310

DELIVERED IN 1957

Landing Ship, Tank	2	7,600
Destroyer	6	17,035
Ammunition Ship	1	7,800
Escort Vessel	8	10,455
Submarine	3	4,410
Submarine, Nuclear	1	3,415
Landing Ship, Dock	1	6,900
Aircraft Carrier	1	55,900
Totals	23	113,515

Shipbuilders Council of America.

FARM MACHINERY & EQUIPMENT

Manufacturers' Shipments in Thousands
(Except Tractors)

	Totals	Domestic	Export
1957	$898,965	$830,308	$68,657
1956	854,618	779,258	75,360
1955	912,157	844,370	67,787
1954	883,267	n.a.	n.a.
1953	1,003,264	908,705	94,559
1952	1,104,054	1,012,553	91,501

Plows and Listers

	Totals	Domestic	Export
1958			
6 Mo.	$32,854	n.a.	n.a.
1957	60,731	$54,977	$5,754
1956	60,956	54,586	6,370
1955	66,417	58,440	7,977
1954	66,506	57,445	9,061
1953	68,703	59,252	9,451
1952	92,632	80,058	12,574

Harrows, Rollers, Pulverizers, Stalk Cutters

1958			
6 Mo.	$48,123	n.a.	n.a.
1957	76,113	$69,617	$6,496
1956	73,775	66,751	7,024
1955	74,706	67,024	7,682
1954	70,695	63,759	6,846
1953	78,785	73,011	5,774
1952	84,558	78,310	6,248

Planting, Seeding, and Fertilizing Machinery

1958			
6 Mo.	$51,818	n.a.	n.a.
1957	87,264	$82,726	$4,538
1956	80,148	75,194	4,954
1955	89,098	84,648	4,450
1954	93,593	89,697	3,896
1953	107,443	103,148	4,295
1952	127,366	121,635	5,731

Cultivators and Weeders

1958			
6 Mo.	$29,458	n.a.	n.a.
1957	45,227	$43,190	$2,037
1956	49,033	46,390	2,643
1955	52,640	49,712	2,928
1954	42,584	39,304	3,280
1953	54,829	51,665	3,164
1952	71,605	67,725	3,880

Sprayers and Dusters

1958			
6 Mo.	$21,365	n.a.	n.a.
1957	39,681	$36,073	$3,608
1956	41,468	37,525	3,943
1955	38,254	33,695	4,559
1954	37,674	33,868	3,806
1953	34,701	31,416	3,285
1952	36,429	32,288	4,141

Harvesting Machinery

1958			
6 Mo.	$154,026	n.a.	n.a.
1957	254,029	$233,496	$20,533
1956	226,139	202,400	23,739
1955	243,561	223,552	20,009
1954	252,566	219,661	32,905
1953	294,024	248,001	46,023
1952	309,384	272,329	37,055

Haying Machinery

1958			
6 Mo.	$96,693	n.a.	n.a.
1957	148,139	$131,266	$16,873
1956	146,771	130,331	16,440
1955	168,447	157,968	10,479
1954	147,883	137,192	10,691
1953	191,441	179,071	12,370
1952	202,962	191,267	11,695

Machines for Preparing Crops for Market or for Use

	Totals	Domestic	Export
1958			
6 Mo.	$15,393	n.a.	n.a.
1957	38,898	$36,359	$2,539
1956	31,437	28,209	3,228
1955	33,070	29,511	3,559
1954	33,892	29,708	4,184
1953	29,919	25,745	4,174
1952	31,461	26,878	4,583

Farm Poultry Equipment

1958	n.a.	n.a.	n.a.
1957	$29,666	$27,384	$2,282
1956	36,088	33,915	2,173
1955	28,429	27,085	1,344
1954	25,566	24,153	1,413
1953	27,216	25,931	1,285
1952	25,442	24,556	886

Farm Dairy Machines and Equipment

1958			
6 Mo.	$7,686	n.a.	n.a.
1957	20,126	$18,473	$1,653
1956	21,455	19,741	1,714
1955	19,260	17,241	2,019
1954	22,183	21,310	873
1953	24,370	22,818	1,552
1952	21,471	19,778	1,693

Barn Equipment

1958	n.a.	n.a.	n.a.
1957	$18,715	$18,292	$423
1956	15,460	15,140	320
1955	12,405	12,084	321
1954	12,856	n.a.	n.a.
1953	15,107	14,951	156
1952	15,526	15,454	72

Barnyard Equipment

1958	n.a.	n.a.	n.a.
1957	$18,566	$18,444	$122
1956	15,619	15,452	167
1955	18,381	n.a.	n.a.
1954	16,742	n.a.	n.a.
1953	12,507	12,439	68
1952	15,064	15,005	59

Farm Wagons, Trucks, and Other Farm Transportation Equipment

1958			
6 Mo.	$17,136	n.a.	n.a.
1957	26,851	$26,077	$774
1956	23,445	22,266	1,179
1955	29,238	28,221	1,017
1954	23,545	n.a.	n.a.
1953	26,555	25,213	1,342
1952	29,505	28,046	1,459

Farm Elevators and Blowers

1958	n.a.	n.a.	n.a.
1957	$34,959	$33,934	$1,025
1956	32,824	31,358	1,466
1955	38,251	36,808	1,443
1954	37,072	n.a.	n.a.
1953	37,664	36,044	1,620
1952	40,649	39,224	1,425
1951	39,378	38,420	958

n.a. = not available.
U. S. Bureau of the Census.

TRACTORS

Manufacturers' Shipments

TOTALS—ALL TYPES

Year	Number	Value (in thousands)
1957	445,285	$747,789
1956	481,229	886,340
1955	572,096	966,347
1954	488,301	736,029
1953	652,761	948,287
1952	667,824	924,615
1951	777,467	1,042,719
1950	698,344	820,031

WHEEL TYPE
(Except garden)

Year	Number	Value (in thousands)
1958		
9 Mo.	181,350	$379,894
1957	231,061	419,648
1956	222,581	389,841
1955	330,581	582,904
1954	256,692	443,267
1953	390,366	590,322
1952	417,177	615,676
1951	559,973	758,001
1950	499,917	574,295

TRACKLAYING TYPE

Year	Number	Value (in thousands)
1958*		
9 Mo.	23,153	$227,747
1957*	36,863	306,126
1956	55,417	471,384
1955	48,891	359,443
1954	40 374	267,918
1953	50 597	328,696
1952	48,155	280,841
1951	49,142	259,960
1950	44,600	223,487

GARDEN TYPE

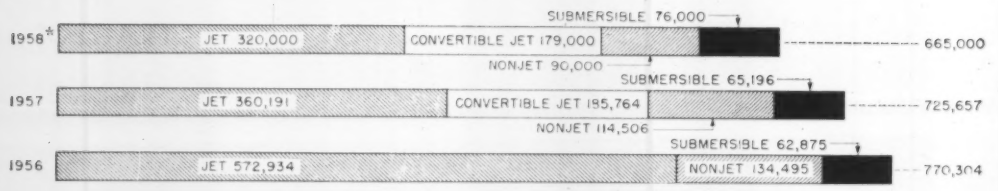
Year	Number	Value (in thousands)
1957	181,361	$22,015
1956	203,231	25,115
1955	192,624	24,000
1954	191,235	24,844
1953	211,798	29,269
1952	202,492	28,098
1951	168 352	24,758
1950	153,827	22,249

*Not exactly comparable with earlier periods.
U. S. Bureau of the Census.

Farm Equipment

METALWORKING FACTS AND FIGURES

DOMESTIC WATER SYSTEMS† Factory Shipments



Jet Pump Systems

Shipments—Units

	1958	1957	1956
Jan.	27,374	28,870	45,436
Feb.	19,209	24,894	41,322
Mar.	28,384	30,385	44,472
Apr.	32,801	29,847	47,969
May	32,654	38,302	54,768
June	38,176	34,834	56,446
July	29,927	34,634	55,300
Aug.	28,504	37,670	61,076
Sept.	31,192	35,834	51,488
Oct.	27,755	29,661	52,516
Nov.	.....	19,242	34,165
Dec.	.....	16,018	27,946

YEARLY TOTALS

	Units	Value
1958*	320,000	.....
1957	360,191	$30,450,000
1956	572,934	47,635,000
1955	593,367	50,835,000
1954	510,436	46,277,000
1953	470,271	43,980,000
1952	432,872	41,769,000
1951	379,652	37,656,000

*Estimated.
U. S. Bureau of the Census.

Nonjet Pump Systems

Shipments—Units

	1958	1957	1956
Jan.	8,273	8,496	9,964
Feb.	7,553	9,691	10,507
Mar.	9,312	10,022	9,807
Apr.	9,505	11,821	13,356
May	8,884	11,538	14,451
June	8,194	11,144	12,548
July	8,879	12,252	12,850
Aug.	8,786	11,255	13,365
Sept.	8,723	10,019	11,565
Oct.	7,843	8,036	10,837
Nov.	.....	4,813	8,518
Dec.	.....	5,419	6,727

YEARLY TOTALS

	Units	Value
1958*	90,000	.....
1957	114,506	$11,641,000
1956	134,495	11,719,000
1955	151,382	12,620,000
1954	167,427	13,596,000
1953	196,995	16,630,000
1952	249,145	25,972,000
1951	237,408	22,303,000

*Estimated.
U. S. Bureau of the Census.

Submersible Pumps

Shipments—Units

	1958	1957	1956
Jan.	5,103	4,086	3,437
Feb.	4,473	3,642	3,664
Mar.	4,408	4,102	3,943
Apr.	6,629	4,386	4,837
May	7,401	5,998	6,653
June	7,553	5,538	7,436
July	7,886	6,668	6,177
Aug.	7,317	7,968	6,754
Sept.	8,371	7,226	6,178
Oct.	6,900	6,284	5,890
Nov.	.....	5,140	5,120
Dec.	.....	4,158	2,786

YEARLY TOTALS

	Units	Value
1958*	76,000	.....
1957	65,196	$15,209,000
1956	62,875	12,822,000
1955	51,583	11,444,000
1954	43,362	11,343,000
1953	34,785	8,649,000

†Prior to 1957, convertible jet data were not collected separately.
*Estimated.
U. S. Bureau of the Census.

Domestic Hand and Windmill Pumps

Factory Shipments—Units

	1958	1957	1956
Jan.	7,270	11,106	14,325
Feb.	8,025	10,984	17,633
Mar.	9,058	11,540	16,876
Apr.	12,407	14,333	13,029
May	10,558	16,245	11,774
June	8,895	11,405	18,444
July	13,747	11,653	19,898
Aug.	10,065	17,183	17,233
Sept.	12,064	15,360	12,539
Oct.	9,536	10,062	11,040
Nov.	.....	7,279	6,548
Dec.	.....	5,471	8,236
Totals	.....	142,621	167,575

Shallow Well Systems

Shipments—Units

	1958	1957	1956
Jan.	21,478	21,693	28,631
Feb.	17,341	21,271	28,654
Mar.	25,106	23,921	29,944
Apr.	27,428	24,740	33,084
May	26,072	28,712	38,229
June	27,976	27,824	36,317
July	23,434	26,826	34,001
Aug.	22,550	28,255	36,798
Sept.	22,163	24,853	29,955
Oct.	20,082	20,139	30,331
Nov.	.....	13,476	21,024
Dec.	.....	13,455	16,933
Totals	.....	275,165	363,901

U. S. Bureau of the Census.

Pump Jacks

Factory Shipments—Units

	1958	1957	1956
Jan.	1,213	1,220	2,505
Feb.	874	1,086	2,137
Mar.	941	975	2,258
Apr.	1,115	890	2,018
May	848	1,261	1,274
June	1,492	845	2,078
July	1,091	1,010	1,803
Aug.	1,320	1,448	2,290
Sept.	1,559	1,084	1,646
Oct.	1,210	802	1,275
Nov.	.....	630	1,047
Dec.	.....	784	1,055
Totals	.....	12,035	21,386

Deep Well Systems

(Except Submersible)

Factory Shipments—Units

	1958	1957	1956
Jan.	14,169	15,673	26,769
Feb.	9,421	13,314	23,175
Mar.	12,590	16,486	24,335
Apr.	14,878	16,928	28,241
May	15,466	21,128	30,990
June	18,394	18,154	32,677
July	15,372	20,060	34,149
Aug.	14,710	20,670	37,643
Sept.	17,752	21,000	33,098
Oct.	15,516	17,558	33,052
Nov.	.....	10,579	21,659
Dec.	.....	7,982	17,740
Totals	.....	199,532	343,528

U. S. Bureau of the Census.

Windmill Heads

Factory Shipments—Units

	1958	1957	1956
Jan.	477	412	618
Feb.	627	649	600
Mar.	727	596	652
Apr.	614	892	1,081
May	546	668	1,116
June	676	523	806
July	444	724	1,019
Aug.	463	509	819
Sept.	669	544	779
Oct.	530	567	636
Nov.	...	351	554
Dec.	...	527	766
Totals	...	6,962	9,446

Convertible Jet Pump Systems

Shipments—Units

	1958	1957
Jan.	12,963	12,610
Feb.	11,373	12,365
Mar.	11,855	14,005
Apr.	16,977	14,207
May	18,574	16,473
June	19,976	17,079
July	18,307	19,794
Aug.	18,069	22,906
Sept.	18,792	18,105
Oct.	16,842	16,990
Nov.	.....	11,595
Dec.	.....	9,635
Total	.....	185,764

U. S. Bureau of the Census.

Windmill Towers

Factory Shipments—Units

	1958	1957	1956
Jan.	252	185	276
Feb.	253	267	243
Mar.	358	236	345
Apr.	278	330	372
May	258	258	457
June	271	179	273
July	194	373	403
Aug.	205	218	286
Sept.	252	288	380
Oct.	246	434	316
Nov.	...	152	289
Dec.	...	288	367
Totals	...	3,208	4,007

Cylinders

Shipments—Units Sold Separately

	1958	1957	1956
Jan.	6,911	8,926	11,344
Feb.	6,382	8,698	11,037
Mar.	6,826	9,236	10,001
Apr.	8,012	8,832	9,740
May	8,236	8,171	12,561
June	8,759	10,232	13,098
July	10,780	9,152	12,823
Aug.	8,937	11,535	12,415
Sept.	9,639	9,683	10,690
Oct.	9,539	10,846	11,664
Nov.	.....	5,970	8,178
Dec.	.....	4,671	7,312
Totals	.....	105,952	130,863

U. S. Bureau of the Census.

INDEXES OF INDUSTRIAL PRODUCTION

FEDERAL RESERVE BOARD—1947-49 = 100

Total Industrial Production

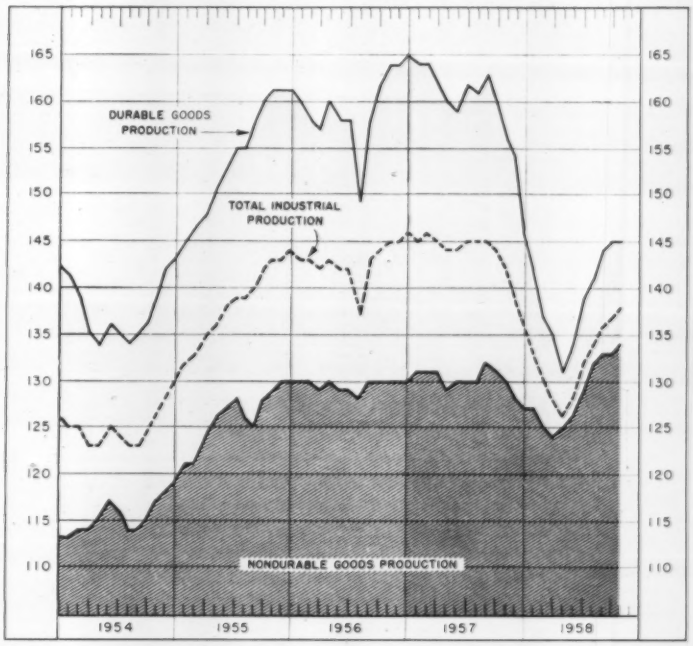
Adjusted for Seasonal Variation

	1958	1957	1956	1955	1954
Jan.	133	145	143	132	125
Feb.	130	146	143	133	125
Mar.	128	145	142	135	123
Apr.	126	144	143	136	123
May	128	144	142	138	125
June	132	145	142	139	124
July	134	145	137	139	123
Aug.	136	145	143	140	123
Sept.	137	144	144	142	124
Oct.	138	142	145	143	126
Nov.	...	139	145	143	128
Dec.	...	135	146	144	130

YEARLY INDEXES

1958*	134	1953	134	1948	104
1957	143	1952	124	1947	100
1956	143	1951	120	1946	90
1955	139	1950	112	1945	107
1954	125	1949	97	1944	125

*Estimated.



Primary Metals

Adjusted for Seasonal Variation

	1958	1957	1956	1955	1954
Jan.	100	143	148	127	111
Feb.	95	143	146	131	109
Mar.	91	137	145	136	103
Apr.	86	134	146	138	103
May	91	132	141	140	106
June	103	132	136	143	108
July	102	132	70	134	103
Aug.	109	136	125	139	105
Sept.	113	131	148	146	105
Oct.	118	128	147	148	111
Nov.	...	121	146	149	118
Dec.	...	107	144	150	121

Metal Fabricating

Adjusted for Seasonal Variation

	1958	1957	1956	1955	1954
Jan.	159	180	170	157	155
Feb.	153	180	168	158	151
Mar.	150	179	167	160	147
Apr.	146	176	171	162	147
May	148	175	169	163	148
June	151	178	170	164	147
July	154	178	171	166	147
Aug.	156	178	173	168	148
Sept.	156	176	174	170	149
Oct.	156	172	177	173	150
Nov.	...	170	178	172	153
Dec.	...	163	181	172	155

Durable Goods

Adjusted for Seasonal Variation

	1958	1957	1956	1955	1954
Jan.	142	164	160	145	141
Feb.	137	164	158	147	139
Mar.	135	162	157	148	135
Apr.	131	160	160	151	134
May	134	159	158	153	136
June	139	162	158	155	135
July	141	161	149	155	134
Aug.	144	163	158	158	135
Sept.	145	160	162	160	137
Oct.	145	156	164	161	139
Nov.	...	154	164	161	142
Dec.	...	146	165	161	143

Nondurable Goods

Adjusted for Seasonal Variation

	1958	1957	1956	1955	1954
Jan.	127	131	130	121	113
Feb.	125	131	130	121	114
Mar.	124	131	129	124	114
Apr.	125	129	130	126	115
May	126	130	129	127	117
June	129	130	129	128	116
July	132	130	128	126	114
Aug.	133	132	130	125	114
Sept.	133	131	130	128	115
Oct.	134	130	130	129	117
Nov.	...	128	130	130	118
Dec.	...	127	130	130	119

Consumer Price Index

Cost of Living, 1947-49=100

	1958	1957	1956	1955
January	122.3	118.2	114.6	114.3
February	122.5	118.7	114.6	114.3
March	123.3	118.9	114.7	114.3
April	123.5	119.3	114.9	114.2
May	123.6	119.6	115.4	114.2
June	123.7	120.2	116.2	114.4
July	123.9	120.8	117.0	114.7
August	123.7	121.0	116.8	114.5
September	123.7	121.1	117.1	114.9
October	123.7	121.1	117.7	114.9
November	....	121.6	117.8	115.0
December	....	121.6	118.0	114.7

MONTHLY AVERAGES

1958*	123.5	1956	116.2
1957	120.2	1955	114.5

*Estimated.
U. S. Bureau of Labor Statistics.

Wholesale Price Indexes

1947-49=100

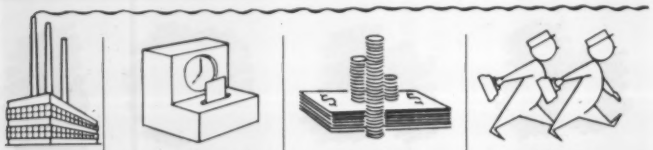
	ALL COMMODITIES		ALL COMMODITIES OTHER THAN FARM PRODUCTS AND FOOD	
	1958	1957	1958	1957
January	118.9	116.9	126.1	125.2
February	119.0	117.0	125.7	125.5
March	119.7	116.9	125.7	125.4
April	119.3	117.2	125.5	125.4
May	119.5	117.1	125.3	125.2
June	119.2	117.4	125.3	125.2
July	119.2	118.2	125.6	125.7
August	119.1	118.4	126.1	126.0
September	119.1	118.0	126.2	126.0
October	119.0	117.8	126.4	125.8
November	....	118.1	....	125.9
December	....	118.5	....	126.1

U. S. Bureau of Labor Statistics.

METALWORKING PRODUCTION WORKERS†

1958	PRIMARY METALS			FABRICATED METAL PRODUCTS			MACHINERY Except Electrical			ELECTRICAL MACHINERY			TRANSPORTATION EQUIPMENT			INSTRUMENTS Related Products		
	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)	Avg Hourly Wages	Avg Weekly Hours	No. of Workers (Thousands)
Jan.	$2.56	37.2	958.4	$2.22	39.3	840.0	$2.34	39.7	1,134.0	$2.12	39.1	793.3	$2.46	38.8	1,266.7	$2.15	39.6	214.9
Feb.	2.56	36.8	912.5	2.22	38.9	805.8	2.35	39.2	1,108.6	2.13	39.0	766.6	2.46	38.6	1,206.9	2.15	39.3	210.9
Mar.	2.57	37.1	885.1	2.23	39.2	786.6	2.36	39.5	1,090.2	2.14	39.1	749.3	2.47	39.4	1,152.7	2.17	39.4	207.8
Apr.	2.58	36.9	848.5	2.24	38.9	765.8	2.36	39.3	1,060.8	2.14	39.0	729.2	2.47	39.3	1,103.0	2.17	39.5	204.1
May	2.58	37.3	840.4	2.25	39.4	755.9	2.37	39.4	1,028.6	2.14	39.1	715.3	2.49	39.7	1,081.2	2.18	39.2	200.4
June	2.61	38.3	859.3	2.27	40.0	772.6	2.38	39.6	1,014.1	2.15	39.6	716.4	2.50	39.8	1,083.8	2.19	39.8	199.1
July	2.68	38.4	851.9	2.28	40.0	764.9	2.38	39.4	990.2	2.15	39.3	711.6	2.53	39.6	1,062.9	2.20	39.7	195.9
Aug.	2.70	38.5	863.8	2.29	40.4	788.3	2.38	39.4	976.8	2.14	39.7	734.0	2.55	40.0	1,033.6	2.21	39.8	199.2
Sept.	2.72	39.2	897.7	2.29	41.0	820.4	2.39	39.9	1,013.4	2.16	40.1	758.7	2.55	39.8	1,099.0	2.21	40.4	205.7
Oct.	2.72	39.0	917.6	2.29	39.8	812.1	2.40	39.6	1,014.1	2.16	39.5	755.0	2.53	38.6	1,000.7	2.21	40.5	108.4
1957 (Avg)	2.50	39.5	1,081.6	2.18	41.4	892.5	2.30	41.0	1,255.7	2.07	40.1	859.7	2.41	40.4	1,383.6	2.11	40.3	226.2
1956 (Avg)	2.36	40.9	1,097.4	2.07	42.1	890.5	2.21	42.2	1,278.7	1.98	40.8	870.3	2.31	40.9	1,354.1	2.01	40.8	230.3
1955 (Avg)	2.24	41.2	1,084.8	1.98	41.6	893.6	2.09	41.8	1,178.6	1.88	40.7	822.0	2.23	41.9	1,407.7	1.91	40.8	223.8
1954 (Avg)	2.09	38.7	987.2	1.90	40.7	841.4	2.01	40.6	1,151.5	1.82	39.8	792.5	2.13	40.5	1,327.5	1.83	40.0	225.2
1953 (Avg)	2.06	40.9	1,131.0	1.85	41.7	930.4	1.96	42.3	1,303.1	1.76	40.8	925:1	2.07	41.2	1,542.9	1.78	41.4	243.7

†Data for 1956 to date are adjusted to first quarter, 1957, benchmark. Prior data are not exactly comparable.
*Estimated.
U. S. Department of Labor.



	HOURS PER WEEK (average)	HOURLY EARNINGS (average)	ANNUAL EMPLOYMENT (average)
1958*	39.3 HOURS	$2.35	4,775,000
1957	40.5 HOURS	$2.26	5,697,300
1956	41.3 HOURS	$2.16	5,721,300

Work Stoppages

1958	Number of Stoppages	Workers Involved	Mandays Lost
10 Mo.	4,325	2,505,000	18,800,000
Jan.	300	110,000	750,000
Feb.	275	70,000	500,000
Mar.	300	200,000	1,200,000
Apr.	375	160,000	1,250,000
May	475	200,000	2,000,000
June	500	250,000	1,650,000
July	525	240,000	1,700,000
Aug.	475	250,000	2,000,000
Sept.	575	500,000	2,500,000
Oct.	525	525,000	5,250,000
	Number of Stoppages Started	**Workers Involved**	**Mandays Lost**
1957	3,673	1,390,000	16,500,000

U. S. Department of Labor.

METALWORKING WAGE & SALARY WORKERS†

In Thousands

1958	Primary Metals	Fabricated Metal Products	Machinery, Except Electrical	Electrical Machinery	Transportation Equip.	Instruments etc.	TOTALS
Jan.	1,183.8	1,080.7	1,609.3	1,161.5	1,736.8	325.7	7,097.8
Feb.	1,134.6	1,042.9	1,579.7	1,132.4	1,676.0	320.9	6,886.5
Mar.	1,104.0	1,021.3	1,558.9	1,114.4	1,620.2	317.4	6,736.2
Apr.	1,065.6	998.9	1,523.4	1,092.3	1,570.0	313.7	6,563.9
May	1,053.4	987.2	1,485.5	1,077.6	1,546.4	309.3	6,459.4
June	1,070.5	1,004.4	1,471.9	1,079.9	1,547.8	308.6	6,483.1
July	1,060.9	998.1	1,449.8	1,078.5	1,528.6	306.8	6,422.7
Aug.	1,073.2	1,022.3	1,436.9	1,104.6	1,500.3	309.1	6,446.4
Sept.	1,104.0	1,055.3	1,471.2	1,129.1	1,563.6	314.2	6,637.4
Oct.	1,124.4	1,013.0	1,466.2	1,122.3	1,450.7	316.8	6,523.4
1957 (Avg)	1,309.7	1,132.3	1,737.9	1,223.3	1,878.1	337.9	7,619.2
1956 (Avg)	1,312.6	1,119.0	1,730.1	1,202.1	1,823.4	335.6	7,522.8
1955 (Avg)	1,284.1	1,108.6	1,592.3	1,123.6	1,832.1	321.0	7,261.7
1954 (Avg)	1,181.2	1,049.8	1,555.9	1,086.4	1,735.0	319.0	6,927.3
1953 (Avg)	1,332.7	1,139.3	1,707.9	1,219.8	1,952.6	334.8	7,687.1

†Data for 1956 to date are adjusted to first quarter, 1957, benchmark. Prior data are not exactly comparable.
U. S. Department of Labor.

Steel Industry's Minimum Labor Rates

	Hourly wage (cents)	Per cent over 1915
1915	20.0	....
Feb. 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
Dec. 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
Oct. 1, 1917	33.0	65.0
Apr. 16, 1918	38.0	90.0
Aug. 1, 1918	42.0	110.0
Oct. 1, 1918	46.2	131.0
Feb. 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
Aug. 29, 1921	30.0	50.0
Sept. 1, 1922	36.0	80.0
Apr. 16, 1923	40.0	100.0
August, 1923	44.0	120.0
Oct. 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
Aug. 19, 1933 (NRA)	40.0	100.0
Apr. 1, 1934	44.0	120.0
November, 1936	52.5	162.5
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	382.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5
Dec. 1, 1950	131.0	555.0
Mar. 1, 1952	143.5	617.5
June 12, 1953	152.0	660.0
July 1, 1954	157.0	685.0
July 1, 1955	168.5	742.5
Aug. 3, 1956	182.0	810.0
July 1, 1957	189.0	845.0
July 1, 1958	196.0	880.0

Compiled by STEEL.

Steel Employment*, Wages, Hours, and Payrolls

1958 by Months

	Number Employees (Wage and salaried workers)	Avg Hr Earnings (Hourly wage earners only)	Avg Hr per Week (Hourly wage earners only)	Total Payrolls (Wages and salaries)
Jan.	575,300	$3.040	35.2	$297,365,000
Feb.	554,300	3.088	34.2	261,725,000
Mar.	539,300	3.092	33.6	271,763,000
Apr.	529,100	3.108	33.1	259,093,000
May	526,700	3.095	34.2	270,121,000
June	537,700	3.113	35.5	278,603,000
July	535,700	3.248	32.4	280,090,000
Aug.	542,000	3.265	34.9	296,396,000
Sept.	555,200	3.274	36.5	308,144,000
Oct.	569,000	3.241	39.1	341,690,000
Nov.	.....	....	...	.....
Dec.	.....	....	...	.....

1957 by Months

Jan.	677,600	$2.831	40.2	$360,620,000
Feb.	677,100	2.852	39.8	327,510,000
Mar.	671,100	2.834	38.7	344,185,000
Apr.	668,200	2.837	38.0	331,520,000
May	666,400	2.824	37.9	338,000,000
June	666,400	2.862	36.7	324,823,000
July	665,300	2.983	34.8	334,600,000
Aug.	663,100	2.990	36.5	343,730,000
Sept.	650,800	3.022	36.4	330,076,000
Oct.	640,300	2.992	38.0	345,580,000
Nov.	625,700	3.013	36.1	316,263,000
Dec.	606,200	3.006	32.9	299,560,000

1956 by Months

Jan.	681,100	$2.617	39.5	$329,134,000
Feb.	683,700	2.613	40.5	317,326,000
Mar.	685,200	2.604	40.7	338,140,000
Apr.	687,900	2.621	39.7	326,740,000
May	679,800	2.619	40.1	333,570,000
June	683,000	2.640	39.0	322,400,000
July	a.	a.	a.	a.
Aug.	677,200	2.697	34.2	300,920,000
Sept.	687,900	2.784	39.2	338,990,000
Oct.	687,100	2.763	40.6	358,935,000
Nov.	688,900	2.792	39.8	346,041,000
Dec.	688,600	2.804	37.7	347,197,000

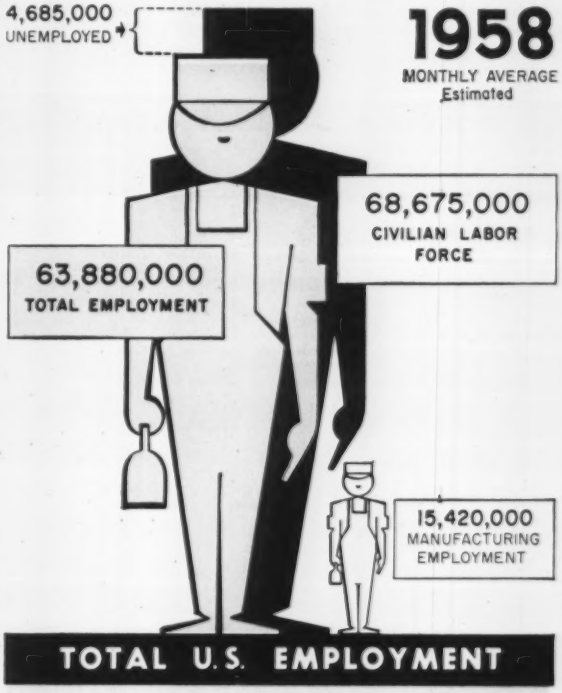
1955 by Months

Jan.	605,100	$2.387	37.8	$258,824,000
Feb.	616,400	2.406	40.0	255,130,000
Mar.	629,900	2.385	41.1	288,229,000
Apr.	643,200	2.407	39.9	282,025,000
May	654,000	2.404	39.7	294,073,000
June	667,100	2.420	40.1	298,439,000
July	676,400	2.598	35.0	296,857,000
Aug.	679,900	2.572	38.9	320,730,000
Sept.	680,200	2.602	39.5	317,106,000
Oct.	677,900	2.600	39.4	325,114,000
Nov.	679,800	2.615	40.6	326,109,000
Dec.	681,800	2.618	39.1	330,645,000

MONTHLY AVERAGES AND TOTAL PAYROLLS

1957	656,517	$2.921	37.2	$3,996,467,000
1956†	684,610	2.687	39.2	3,659,393,000
1955	657,642	2.501	39.3	3,593,281,000
1954	611,000	2.333	36.1	2,908,339,000
1953	682,800	2.267	39.4	3,356,504,000
1952‡	672,530	2.148	39.5	2,822,250,000
1951	670,717	1.945	40.2	2,881,170,000
1950	635,500	1.746	39.0	2,389,759,000
1949	620,500	1.703	34.5	2,061,770,000
1948	635,600	1.630	39.1	2,234,461,000
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000

a.—No reports issued because of steelworkers' strike.
*Starting in January, 1957, employment figures exclude those engaged in fabricating.
†Eleven months.
‡Ten months.
American Iron & Steel Institute.



(In Thousands)

1958 by Months†

	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
Jan.	66,732	62,238	4,494	15,865
Feb.	67,160	61,988	5,173	15,593
Mar.	67,510	62,311	5,198	15,355
Apr.	68,027	62,907	5,120	15,104
May	68,965	64,061	4,904	15,023
June	70,418	64,981	5,537	15,206
July	70,473	65,179	5,294	15,161
Aug.	70,067	65,367	4,699	15,462
Sept.	68,740	64,629	4,111	15,744
Oct.	69,111	63,306	3,805	15,553
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....

1957 by Months†

Jan.	65,821	62,578	3,244	16,959
Feb.	66,311	63,190	3,121	16,945
Mar.	66,746	63,865	2,882	16,933
Apr.	66,951	64,261	2,690	16,822
May	67,893	65,178	2,715	16,762
June	69,842	66,504	3,337	16,852
July	70,228	67,221	3,007	16,710
Aug.	68,994	66,385	2,609	16,955
Sept.	68,225	65,674	2,552	16,905
Oct.	68,513	66,005	2,508	16,783
Nov.	68,061	64,873	3,188	16,573
Dec.	67,770	64,396	3,374	16,325
1957 Avg.	67,946	65,011	2,936	16,800

1956 by Months

Jan.	65,775	62,891	2,885	16,852
Feb.	65,490	62,576	2,914	16,844
Mar.	65,913	63,078	2,834	16,781
Apr.	66,555	63,991	2,564	16,782
May	67,846	65,238	2,608	16,730
June	69,430	66,503	2,927	16,825
July	69,489	66,655	2,833	16,301
Aug.	68,947	66,752	2,195	17,035
Sept.	68,069	66,071	1,998	17,119
Oct.	68,082	66,174	1,909	17,238
Nov.	67,732	65,269	2,463	17,180
Dec.	67,029	64,550	2,479	17,159
1956 Avg.	67,530	64,979	2,551	16,905

MONTHLY AVERAGES

1955	65,847	63,193	2,654	16,563
1954	64,468	61,238	3,230	15,995
1953	63,815	62,213	1,602	17,238
1952	62,966	61,293	1,673	16,334
1951	62,884	61,005	1,879	16,104
1950	63,099	59,957	3,142	14,987
1949	62,105	58,710	3,395	14,178
1948	61,442	59,378	2,064	15,321
1947	60,168	58,027	2,142	15,290
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381

†Not exactly comparable with data for years prior to 1957.
U. S. Departments of Commerce and Labor.

Labor

METALWORKING FACTS AND FIGURES

Labor Union Membership

(Thousands of members)

Year	AFL-CIO	Independent or Unaffiliated Unions	Totals
1958*	17,200	1,600	18,800
1957*	16,800	1,600	18,400
1956	16,753	1,573	18,326
1955	15,877	1,688	17,565

	American Federation of Labor	Congress of Industrial Organizations	Independent or Unaffiliated Unions	Totals
1954	10,746	5,185	1,826	17,757
1953*	10,900	5,200	1,800	17,900
1952*	9,500	5,000	2,000–2,500	16,500–17,000
1951	9,500	5,000	2,000–2,500	16,500–17,000
1950	7,143	n.a.	2,400–2,800	14,000–16,000
1949	7,241	n.a.	2,000–2,300	14,000–16,000
1948	7,221	n.a.	2,000–2,500	14,000–16,000
1947	7,578	6,000	1,836	15,414
1946	7,152	6,000	1,822	14,974
1945	6,931	6,000	1,865	14,796
1944	6,807	5,935	1,879	14,621
1943	6,564	5,285	1,793	13,642
1942	5,483	4,195	1,084	10,762
1941	4,569	5,000	920	10,489
1940	4,247	3,625	1,072	8,944
1939	4,006	4,000	974	8,980
1938	3,623	4,038	604	8,265
1937	2,861	3,718	639	7,218
1936	3,422	....	742	4,164
1935	3,045	....	683	3,728
1934	2,608	....	641	3,249
1933	2,127	....	730	2,857
1932	2,532	....	694	3,226
1931	2,890	....	636	3,526
1930	2,961	....	671	3,632
1929	2,934	....	691	3,625
1928	2,896	....	671	3,567
1927	2,813	....	787	3,600
1926	2,804	....	788	3,592
1925	2,877	....	689	3,566
1924	2,866	....	683	3,549
1923	2,926	....	703	3,629
1922	3,196	....	754	3,950
1921	3,907	....	815	4,722
1920	4,079	....	955	5,034
1919	3,260	....	786	4,046
1918	2,726	....	642	3,368
1917	2,371	....	605	2,976
1916	2,073	....	649	2,722
1915	1,946	....	614	2,560
1914	2,021	....	626	2,647
1913	1,996	....	665	2,661
1912	1,770	....	635	2,405
1911	1,762	....	556	2,318
1910	1,562	....	554	2,116
1909	1,483	....	482	1,965
1908	1,587	....	505	2,092
1907	1,539	....	538	2,077
1906	1,454	....	438	1,892
1905	1,494	....	424	1,918

*Estimated by STEEL.
n.a.—not available.
U. S. Department of Labor.

Labor Turnover

(Rate per 100 employees in manufacturing industries)

	SEPARATIONS									
	Quits		Discharges		Layoffs		Miscellaneous		Totals	
	1958	1957	1958	1957	1958	1957	1958	1957	1958	1957
Jan.	0.8	1.3	0.2	0.2	3.8	1.5	0.3	0.3	5.0	3.3
Feb.	0.7	1.2	0.2	0.2	2.9	1.4	0.2	0.2	3.9	3.0
Mar.	0.7	1.3	0.2	0.2	3.2	1.4	0.2	0.2	4.2	3.3
Apr.	0.7	1.3	0.2	0.2	3.0	1.5	0.2	0.2	4.1	3.3
May	0.8	1.4	0.1	0.3	2.4	1.5	0.2	0.3	3.6	3.4
June	0.8	1.3	0.2	0.2	1.8	1.1	0.2	0.2	2.9	3.0
July	0.9	1.4	0.1	0.2	2.0	1.3	0.2	0.2	3.2	3.1
Aug.	1.2	1.9	0.2	0.3	1.9	1.6	0.2	0.3	3.5	4.0
Sept.	1.5	2.2	0.2	0.2	1.4	1.8	0.2	0.2	3.3	4.4
Oct.	..	1.3	..	0.2	..	2.3	..	0.2	..	4.0
Nov.	..	0.9	..	0.2	..	2.7	..	0.2	..	4.0
Dec.	..	0.7	..	0.2	..	2.7	..	0.2	..	3.8

ACCESSIONS									
	1958	1957		1958	1957		1958	1957
Jan.	2.5	3.2	May	3.0	3.0	Sept.	3.8	3.3
Feb.	2.2	2.8	June	3.8	3.9	Oct.	..	2.9
Mar.	2.4	2.8	July	3.3	3.2	Nov.	..	2.2
Apr.	2.5	2.8	Aug.	3.9	3.2	Dec.	..	1.7

U. S. Department of Labor.

Wages and Hours in Selected Industries

(Production workers)

Stamped and Pressed Metal Products

	EARNINGS (Hourly avg)		HOURS (Weekly avg)	
	1958	1957	1958	1957
Jan.	$2.33	$2.24	38.5	40.9
Feb.	2.35	2.23	38.6	40.8
Mar.	2.37	2.26	39.6	41.1
Apr.	2.40	2.26	40.0	40.6
May	2.43	2.28	40.2	40.9
June	2.43	2.33	40.3	41.2
July	2.43	2.31	40.2	40.2
Aug.	2.43	2.30	40.2	40.6
Sept.	...	2.34	...	41.5
Oct.	...	2.32	...	40.7
Nov.	...	2.37	...	41.2
Dec.	...	2.34	...	39.8

Metalworking Machinery

(Except machine tools)

	1958	1957	1958	1957
Jan.	$2.46	$2.34	38.9	42.3
Feb.	2.46	2.35	38.7	42.6
Mar.	2.47	2.36	38.8	42.6
Apr.	2.49	2.36	38.8	42.7
May	2.47	2.38	37.9	42.0
June	2.48	2.38	38.4	41.7
July	2.52	2.41	38.7	41.6
Aug.	2.56	2.41	39.0	41.2
Sept.	...	2.44	...	42.1
Oct.	...	2.43	...	40.2
Nov.	...	2.44	...	39.7
Dec.	...	2.45	...	40.2

Machine Tools

	1958	1957	1958	1957
Jan.	$2.38	$2.39	39.1	44.7
Feb.	2.35	2.39	38.2	44.8
Mar.	2.38	2.39	38.2	44.0
Apr.	2.38	2.39	37.6	43.7
May	2.39	2.39	37.1	42.8
June	2.40	2.40	37.4	42.5
July	2.39	2.37	37.0	41.0
Aug.	2.40	2.38	37.1	41.0
Sept.	...	2.41	...	40.5
Oct.	...	2.40	...	40.1
Nov.	...	2.41	...	39.1
Dec.	...	2.41	...	39.8

Fabricated Structural Metal Products

	1958	1957	1958	1957
Jan.	$2.27	$2.18	40.4	41.5
Feb.	2.28	2.18	39.4	41.8
Mar.	2.30	2.19	39.6	41.9
Apr.	2.29	2.20	39.5	41.8
May	2.29	2.21	39.8	42.1
June	2.31	2.22	40.5	42.2
July	2.35	2.24	40.4	41.8
Aug.	2.37	2.27	41.0	41.8
Sept.	...	2.28	...	42.1
Oct.	...	2.28	...	41.4
Nov.	...	2.28	...	40.8
Dec.	...	2.28	...	41.1

U. S. Department of Labor.

Agricultural Machinery and Tractors

	EARNINGS (Hourly avg)		HOURS (Weekly avg)	
	1958	1957	1958	1957
Jan.	$2.38	$2.26	39.7	39.8
Feb.	2.39	2.27	38.8	39.6
Mar.	2.41	2.28	39.4	40.1
Apr.	2.40	2.27	39.9	39.9
May	2.42	2.27	40.5	40.2
June	2.42	2.29	40.2	40.0
July	2.44	2.28	40.1	39.8
Aug.	2.39	2.29	39.4	38.9
Sept.	...	2.34	...	39.9
Oct.	...	2.35	...	39.5
Nov.	...	2.36	...	39.0
Dec.	...	2.37	...	39.9

Automobiles

	1958	1957	1958	1957
Jan.	$2.48	$2.43	37.3	41.3
Feb.	2.48	2.41	37.3	41.2
Mar.	2.50	2.41	38.3	40.3
Apr.	2.50	2.39	38.4	39.4
May	2.51	2.40	38.9	39.1
June	2.51	2.46	39.1	39.6
July	2.51	2.46	38.8	38.6
Aug.	2.53	2.47	39.2	39.9
Sept.	...	2.52	...	39.3
Oct.	...	2.53	...	39.2
Nov.	...	2.57	...	41.9
Dec.	...	2.51	...	40.1

Aircraft and Parts

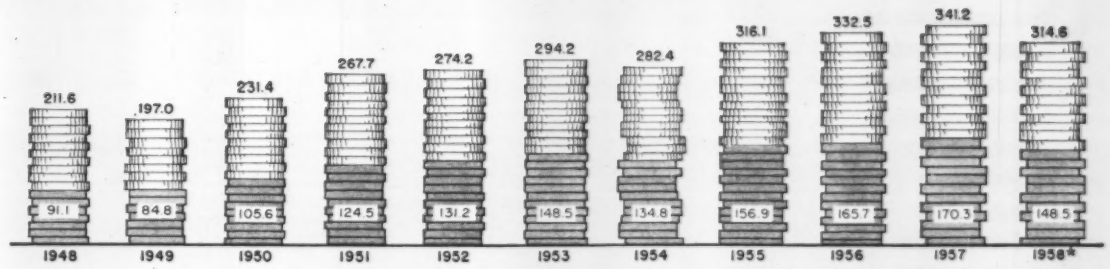
	1958	1957	1958	1957
Jan.	$2.43	$2.33	40.6	42.6
Feb.	2.44	2.33	40.4	42.3
Mar.	2.44	2.35	40.6	42.2
Apr.	2.44	2.36	40.3	42.0
May	2.48	2.33	40.5	40.6
June	2.51	2.34	40.7	40.6
July	2.54	2.35	40.4	40.4
Aug.	2.54	2.38	40.8	40.4
Sept.	...	2.38	...	40.2
Oct.	...	2.40	...	40.1
Nov.	...	2.41	...	39.9
Dec.	...	2.44	...	40.6

Gray Iron Foundries

	1958	1957	1958	1957
Jan.	$2.23	$2.13	35.3	39.9
Feb.	2.23	2.15	35.4	39.1
Mar.	2.23	2.15	35.6	38.6
Apr.	2.24	2.15	35.1	38.5
May	2.24	2.16	36.1	38.4
June	2.25	2.18	36.9	39.1
July	2.27	2.19	37.1	39.1
Aug.	2.25	2.19	37.2	38.8
Sept.	...	2.20	...	39.0
Oct.	...	2.23	...	37.6
Nov.	...	2.23	...	37.3
Dec.	...	2.24	...	37.3

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS—NOT ADJUSTED FOR SEASONAL VARIATION)
Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries
*Estimated
U. S. Office of Business Economics



Manufacturers' Sales

Millions of Dollars, Shipments, Seasonally Adjusted

1958	All Manufacturers	Total Durables	Primary Metals	Fab. Metal Products	Machinery	Transport. Equip.	Other Durables†
Jan.	26,350	12,646	1,952	1,402	3,847	3,001	2,444
Feb.	25,542	12,038	1,733	1,354	3,726	2,876	2,349
Mar.	24,931	11,670	1,635	1,332	3,685	2,708	2,310
Apr.	24,945	11,532	1,657	1,302	3,748	2,466	2,359
May	25,206	11,643	1,656	1,331	3,736	2,536	2,384
June	25,747	12,086	1,854	1,397	3,780	2,610	2,445
July	26,284	12,256	1,917	1,454	3,808	2,550	2,527
Aug.	26,388	12,385	1,984	1,482	3,817	2,582	2,520
Sept.	26,778	12,723	2,065	1,593	3,999	2,438	2,628
Oct.	27,229	13,013	2,189	1,564	3,981	2,616	2,663
Nov.	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....
MONTHLY AVERAGES							
Unadjusted for Seasonal Variations							
1957	28,434	14,190	2,316	1,536	4,257	3,347	2,734
1956	27,711	13,805	2,362	1,474	3,988	3,003	2,978
1955	26,341	13,079	2,206	1,356	3,449	3,200	2,868
1954	23,530	11,237	1,676	1,226	3,208	2,635	2,492
1953	24,515	12,375	1,987	1,267	3,470	3,086	2,565
1952	22,850	10,935	1,727	1,135	3,200	2,465	2,408
1951	22,309	10,375	1,924	1,138	2,832	2,134	2,347
1950	19,285	8,804	1,587	976	2,260	1,888	2,093

†Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass, and miscellaneous industries.
U. S. Office of Business Economics.

Manufacturers' New Orders

Millions of Dollars, Seasonally Adjusted

1958	All Manufacturers	Total Durables	Primary Metals	Fab. Metal Products	Machinery	Transport. Equip.	Other Durables†
Jan.	24,369	10,704	1,556	1,239	3,336	2,356	2,217
Feb.	24,110	10,688	1,369	1,176	3,545	2,361	2,237
Mar.	24,758	11,488	1,371	1,175	3,511	3,317	2,114
Apr.	24,498	10,833	1,543	1,230	3,596	2,093	2,371
May	24,998	11,423	1,671	1,322	3,690	2,265	2,475
June	25,785	12,245	1,952	1,496	3,592	2,678	2,527
July	26,450	12,512	2,044	1,501	3,770	2,691	2,506
Aug.	26,096	12,177	2,063	1,523	3,851	2,245	2,495
Sept.	27,021	12,859	2,334	1,578	4,242	1,946	2,759
Oct.	27,825	13,511	2,412	1,578	3,998	2,695	2,828
Nov.	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....
MONTHLY AVERAGES							
Unadjusted for Seasonal Variations							
1957	27,257	13,085	2,125	1,450	3,996	2,847	2,666
1956	28,324	14,442	2,419	1,511	4,237	3,296	2,979
1955	27,171	13,854	2,562	1,424	3,732	3,342	2,894
1954	22,480	10,156	1,560	1,124	2,737	2,291	2,444
1953	23,111	11,032	1,754	1,152	3,138	2,489	2,500
1952	23,582	11,688	1,722	1,143	3,272	3,136	2,414
1951	24,511	12,675	2,050	1,276	3,709	3,216	2,422
1950	20,980	10,315	1,787	1,119	2,784	2,348	2,277

†Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass, and miscellaneous industries.
U. S. Office of Business Economics.

Manufacturers' Inventories

Millions of Dollars, Seasonally Adjusted at End of Month

1958	All Manufacturers	Total Durables	Primary Metals	Fab. Metal Products	Machinery	Transport. Equip.	Other Durables†
Jan.	52,911	30,625	4,273	3,081	10,222	7,529	5,520
Feb.	52,445	30,266	4,297	3,041	10,101	7,285	5,542
Mar.	52,009	29,864	4,342	2,918	9,920	7,113	5,571
Apr.	51,486	29,424	4,362	2,925	9,744	6,863	5,530
May	50,896	28,981	4,277	2,852	9,636	6,721	5,495
June	50,246	28,528	4,169	2,844	9,446	6,595	5,474
July	49,777	28,311	4,122	2,814	9,323	6,584	5,468
Aug.	49,425	28,066	4,110	2,777	9,221	6,536	5,422
Sept.	49,296	28,048	4,043	2,842	9,074	6,751	5,338
Oct.	49,300	27,979	4,004	2,893	9,032	6,674	5,376
Nov.	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....
YEAREND INVENTORIES							
Unadjusted for Seasonal Variations							
1957	53,688	31,137	4,466	2,963	10,283	7,885	5,540
1956	52,515	30,591	4,119	3,056	10,316	7,714	5,386
1955	46,572	26,609	3,546	2,692	8,658	6,849	4,864
1954	43,310	24,133	3,245	2,378	7,923	6,047	4,540
1953	45,736	26,272	3,513	2,634	8,796	6,567	4,762
1952	44,029	24,428	3,119	2,379	8,553	5,773	4,604
1951	43,011	22,815	2,789	2,397	8,055	4,941	4,633
1950	34,534	16,768	2,444	1,779	5,625	3,150	3,770

†Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass, and miscellaneous industries.
U. S. Office of Business Economics.

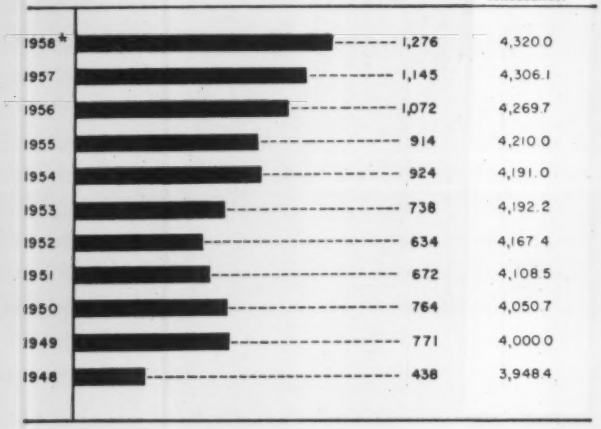
Manufacturers' Backlogs

Millions of Dollars, Unfilled Orders, End of Month

1958	All Manufacturers	Total Durables	Primary Metals	Fab. Metal Products	Machinery	Transport. Equip.	Other Durables†
Jan.	49,103	46,563	4,467	3,343	16,703	18,132	3,918
Feb.	47,836	45,372	4,263	3,199	16,548	17,466	3,896
Mar.	47,504	45,059	4,040	3,099	16,327	17,763	3,830
Apr.	46,510	44,017	3,757	3,038	16,184	17,203	3,835
May	46,116	43,543	3,738	3,050	16,093	16,783	3,879
June	46,353	43,686	3,558	3,034	16,084	16,954	4,056
July	46,747	44,036	3,694	3,102	16,230	16,884	4,126
Aug.	46,700	43,963	3,800	3,109	16,281	16,647	4,126
Sept.	46,232	43,577	3,867	3,086	16,308	16,184	4,132
Oct.	45,868	43,244	3,898	3,049	16,156	16,094	4,047
Nov.	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....
YEAREND BACKLOGS							
1957	50,697	48,127	4,796	3,483	17,120	18,750	3,978
1956	64,210	61,015	7,144	4,526	20,083	24,584	4,678
1955	56,861	53,372	6,455	4,077	17,092	21,072	4,676
1954	46,900	44,081	3,381	3,268	13,708	19,372	4,352
1953	59,496	57,060	4,766	4,497	19,365	23,490	4,942
1952	76,343	73,170	7,563	5,871	23,347	30,651	5,744
1951	67,553	64,141	7,620	5,776	22,487	22,596	5,662
1950	41,126	36,550	6,102	4,100	11,969	9,613	4,766

†Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass, and miscellaneous industries.
U. S. Office of Business Economics.

BUSINESS FAILURES
Total Monthly Averages



Failures—Liabilities

	FAILURES			LIABILITIES	
	Totals	Construction	Mfg., Mining	Construction	Mfg., Mining
1958					
January	1,279	176	219	$9,868,000	$24,917,000
February	1,238	177	208	8,747,000	24,331,000
March	1,495	202	281	11,921,000	23,311,000
April	1,458	209	257	9,612,000	29,538,000
May	1,341	207	242	10,771,000	17,912,000
June	1,260	161	235	7,390,000	18,959,000
July	1,253	181	255	13,966,000	22,673,000
August	1,127	158	206	8,687,000	15,742,000
September	1,039	163	187	7,841,000	18,167,000
October	1,271	176	215	6,771,000	12,141,000
November	....	...	...	.....	.....
December	....	...	...	.....	.....
Monthly Averages					
1958*	1,276	...	...	.....	.....
1957	1,145	175	201	$9,192,700	$16,403,400
1956	1,072	153	190	8,400,250	15,935,833
1955	914	117	184	6,931,583	13,078,750
1954	924	109	190	4,735,750	14,273,667
1953	738	85	155	3,610,583	13,237,833
1952	634	70	132	3,012,083	8,746,167
1951	672	80	128	3,123,000	7,581,000
1950	764	76	173	2,138,000	7,925,000
1949	771	70	194	2,270,000	11,939,000
1948	438	37	123	1,301,000	10,858,000

Dun & Bradstreet Inc. *Estimated.

Businesses in Operation
(In Thousands at Beginning of Half)

	Totals	Contract Construction	Manufacturing	Service
1958*	4,320.0	.....	.....	.....
1st Half	4,322.7	486.7	308.6	768.1
2nd Half	.....	.....	.....	.....
1957 (Avg)	4,306.1	485.2	310.5	760.5
1st Half	4,289.0	481.0	310.2	756.5
2nd Half	4,323.2	489.4	310.8	764.4
YEARLY TOTALS				
1956	4,269.7	477.5	310.5	751.1
1955	4,210.6	455.8	311.9	742.8
1954	4,191.0	436.3	319.7	740.6
1953	4,192.2	425.0	326.7	740.4
1952	4,167.4	411.0	328.8	739.5
1951	4,108.5	388.6	327.2	735.5
1950	4,050.7	370.5	320.7	735.6
1949	4,000.0	347.5	320.5	736.8
1948	3,948.4	329.0	320.0	738.3
1947	3,783.2	292.6	312.0	711.5
1946	3,487.2	243.8	285.9	656.5
1945	3,113.9	176.8	258.4	591.5

*Estimated by STEEL.
U. S. Office of Business Economics.

New Business Incorporations

	1958	1957	1956	1955	1954
January	13,080	13,387	13,363	13,181	9,543
February	10,466	10,791	12,503	11,369	8,533
March	11,670	12,049	12,822	13,417	10,514
April	11,329	12,312	12,475	11,756	10,272
May	11,943	12,220	13,142	12,029	9,280
June	11,991	11,269	11,952	12,605	9,748
July	12,454	11,686	11,513	10,893	9,409
August	12,234	11,361	11,339	10,983	9,041
September	12,932	10,526	9,583	11,024	9,256
October	13,633	11,251	11,546	10,698	9,852
November	.....	9,270	9,749	10,157	9,735
December	.....	10,575	10,788	11,539	11,981
Totals	....	136,697	140,775	139,651	117,164
Monthly Avg	12,173	11,391	11,731	11,638	9,764

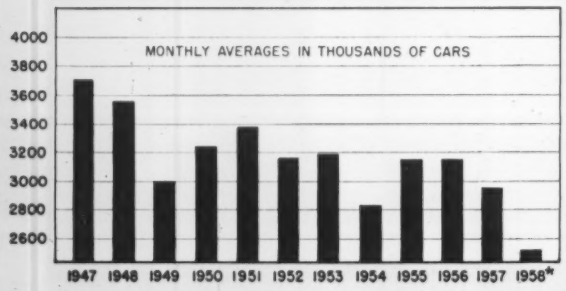
Dun & Bradstreet Inc.

Foreign Trade
Value—Millions of Dollars

	Exports			Imports		
	1958	1957	1956	1958	1957	1956
Jan.	1,510.9	1,680.6	1,283.5	1,095.3	1,112.9	1,073.3
Feb.	1,344.9	1,611.0	1,361.5	961.5	992.9	1,051.2
Mar.	1,556.9	2,150.8	1,582.3	1,071.1	1,132.5	1,102.1
Apr.	1,530.6	1,863.6	1,511.7	1,057.2	1,119.0	991.1
May	1,637.9	1,813.2	1,714.4	1,063.0	1,105.7	1,093.6
June	1,407.9	1,786.1	1,690.2	1,036.6	983.6	1,033.4
July	1,419.0	1,691.8	1,620.0	1,050.0	1,146.5	1,050.7
Aug.	1,395.9	1,677.3	1,529.0	952.5	1,042.5	1,050.6
Sept.	1,361.7	1,540.3	1,523.0	.....	1,008.7	992.8
Oct.	1,612.0	1,674.4	1,659.1	.....	1,147.9	1,115.5
Nov.	.....	1,682.7	1,519.5	.....	1,043.2	984.3
Dec.	.....	1,638.6	1,993.1	.....	1,141.1	1,051.3

U. S. Bureau of the Census.

FREIGHT CARLOADINGS



1958—By Weeks

Jan. 4	471,749	May 3	533,004	Sept. 6	563,351
Jan. 11	569,444	May 10	535,204	Sept. 13	665,999
Jan. 18	572,353	May 17	560,765	Sept. 20	667,277
Jan. 25	550,667	May 24	570,670	Sept. 27	672,924
Feb. 1	550,426	May 31	529,547	Oct. 4	677,016
Feb. 8	532,289	June 7	612,715	Oct. 11	686,138
Feb. 15	533,237	June 14	622,221	Oct. 18	695,768
Feb. 22	492,389	June 21	627,677	Oct. 25	674,264
Mar. 1	553,615	June 28	626,573	Nov. 1	674,477
Mar. 8	544,173	July 5	457,661	Nov. 8	658,086
Mar. 15	539,057	July 12	491,142	Nov. 15	643,795
Mar. 22	533,019	July 19	581,817	Nov. 22	619,350
Mar. 29	532,172	July 26	607,701	Nov. 29	539,191
Apr. 5	516,225	Aug. 2	622,204	Dec. 6	594,476
Apr. 12	521,035	Aug. 9	618,580	Dec. 13	.....
Apr. 19	534,475	Aug. 16	625,991	Dec. 20	.....
Apr. 26	533,724	Aug. 23	633,687	Dec. 27	.....
		Aug. 30	645,432		

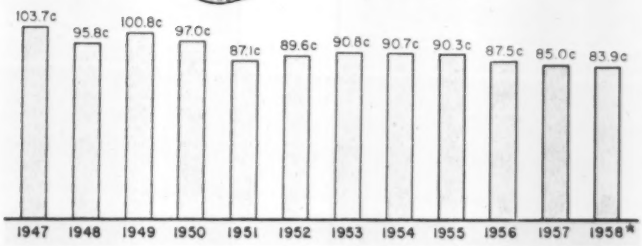
Association of American Railroads. *Estimated.

Finance

METALWORKING FACTS AND FIGURES

PURCHASING POWER OF THE DOLLAR

(1947-49=100)



AS MEASURED BY:	Wholesale Prices	Consumers' Prices
1958		
Jan.	84.1	81.8
Feb.	84.0	81.6
Mar.	83.5	81.1
Apr.	83.8	81.0
May	83.7	80.9
June	83.9	80.8
July	83.9	80.7
Aug.	84.0	80.8
Sept.	84.0	80.8
Oct.	....	....
Nov.	....	....
Dec.	....	....
Monthly Averages		
1957	85.0	83.2
1956	87.5	86.1
1955	90.3	87.3
1954	90.7	87.1
1953	90.8	87.4
1952	89.6	88.1
1951	87.1	90.1
1950	97.0	97.3
1949	100.8	98.2
1948	95.8	97.3

*Estimated.
U. S. Office of Business Economics.

National Income

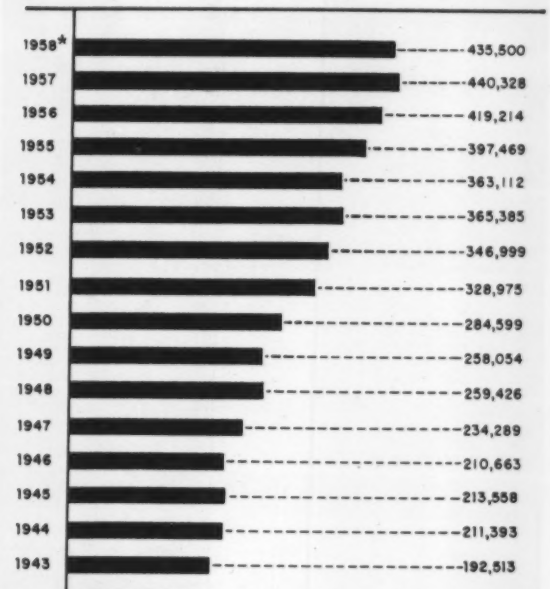
(Millions of dollars)

1958*	357,000
1957	363,951
1956	349,356
1955	330,206
1954	301,794
1953	305,573
1952	292,155
1951	279,313
1950	241,876
1949	217,690
1948	223,487
1947	198,177
1946	180,879
1945	181,248
1944	182,639
1943	170,310
1942	137,694
1941	104,710
1940	81,634
1939	72,753
1938	67,581
1937	73,618

*Estimated.
Dept. of Commerce.

GROSS NATIONAL PRODUCT

(Millions of Dollars)



*Estimated

Department of Commerce.

U. S. Revenues, Expenditures, Debt

Year	Net Receipts (millions)	Per Capita Receipts	Expenditures (millions)	Per Capita Expenditures	Gross Debt (millions)	Per Capita Debt
1958	$89,082	$397.43	$71,987	$414.14	$276,343	$1589.80
1957	71,031	415.43	69,433	406.09	270,527	1582.21
1956	68,165	406.09	66,539	396.40	272,751	1624.89
1955	60,389	365.89	64,568	391.21	274,374	1662.41
1954	64,654	398.64	67,722	417.86	271,260	1672.51
1953	64,596	405.19	73,985	464.08	266,071	1668.10
1952	62,129	396.31	66,146	421.93	259,105	1652.77
1951	48,142	312.36	44,632	289.59	255,222	1655.97
1950	37,043	244.42	40,167	265.03	257,357	1698.13
1949	38,246	256.68	40,057	268.83	252,770	1696.44
1948	44,746	306.24	36,326	248.61	252,292	1726.68
1947	44,703	311.77	42,505	296.44	258,376	1801.94
1946	43,037	305.25	65,018	461.17	269,422	1910.97
1945	46,456	332.78	100,404	719.25	258,682	1853.01
1944	44,149	319.92	93,743	679.29	201,003	1455.52
1943	22,281	163.25	78,182	572.83	136,696	1001.55
1942	12,799	95.25	32,491	241.80	72,422	537.35
1941	7,607	57.29	12,774	74.16	48,961	367.54
1940	5,387	44.09	9,127	70.65	42,967	325.63
1939	5,164	43.21	8,765	70.65	40,445	308.34
1938	5,854	47.89	7,304	59.70	37,167	285.43
1937	5,028	40.93	8,281	62.69	36,427	281.82
1936	4,115	32.17	9,068	69.41	33,545	261.20
1935	3,800	29.88	7,583	58.00	28,701	225.07
1934	3,115	24.64	6,370	56.19	27,053	213.65
1933	2,079	16.54	4,325	40.91	22,538	179.21
1932	2,005	16.06	4,948	41.28	19,487	155.93
1931	3,190	25.70	4,091	32.99	16,801	135.37
1930	4,177	33.01	3,994	32.42	16,185	131.49
1929	4,033	33.19	3,848	31.67	16,931	139.40
1928	4,042	33.73	3,643	30.40	17,604	146.69
1927	4,129	34.94	3,493	29.56	18,510	156.04
1926	3,962	33.98	3,584	30.76	19,643	167.70
1925	3,780	32.91	3,529	30.73	20,516	177.82
1924	4,012	35.44	3,507	30.98	21,251	186.86
1923	4,007	35.93	3,697	33.15	22,349	200.10

Annual Statements of the Treasury.

Corporate Income, Taxes, Dividends

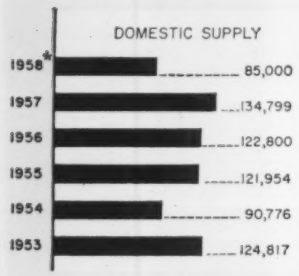
(All industries—Millions of dollars)

	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1958					
1st Qtr	31,700§	16,100§	15,500§	1,832	.....
2nd Qtr	32,000§	16,300§	15,700§	1,784	.....
1957	43,426	21,649	21,777	12,355	9,422
1956	45,493	22,422	23,071	12,038	11,033
1955	44,862	21,827	23,035	11,215	11,820
1954	34,061	17,220	16,841	9,839	7,002
1953	38,311	20,222	18,089	9,225	8,864
1952	36,691	19,459	17,232	8,954	8,278
1951	42,153	22,447	19,706	9,029	10,677
1950	40,628	17,865	22,763	9,208	13,555

†Federal and state corporate income and excess profits tax liability.
§Seasonally adjusted quarterly totals at annual rates.
Department of Commerce.

IRON ORE SUPPLY (Exclusive of stocks on hand)

Thousands of Gross Tons



Gross Tons

1958	U. S. Mine Production	Imports	Exports	Total Domestic Supply
Jan.	3,375,000	1,785,210	36,840	5,123,370
Feb.	3,049,000	1,460,269	65,401	4,443,868
Mar.	3,011,000	1,491,834	67,047	4,435,787
Apr.	2,994,000	1,735,351	82,922	4,646,429
May	5,426 000	2,256,370	298,250	7,384,120
June	8,086 000	3,007,525	467,525	10,626,000
July	8,636,000	2,950,867	697,770	10,889,097
Aug.	8,580,000	2,854,056	603,836	10,830,220
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1957	106,148,000	33,653,048	5,002,153	134,798,895
1956	97,877,000	30,431,152	5,508,296	122,799,856

*Estimated.
U. S. Bureau of Mines.

Iron Ore Stocks†

At Furnaces and Docks in U. S.

Gross Tons

	1958	1957
Jan.	64,036,404	55,235,619
Feb.	59,207,568	46,763,305
Mar.	55,402,195	39,456,240
Apr.	51,070,943	30,785,913
May	47,942,864	25,926,204
June	47,836,807	31,731,197
July	52,259,606	39,168,711
Aug.	58,594,230	47,647,670
Sept.	63,473,837	55,506,534
Oct.	68,012,807	61,843,964
Nov.	71,698,289	68,444,911
Dec.	.....	72,042,487

†On first day of month.
American Iron Ore Association and American Iron & Steel Institute.

Iron Ore Consumption in U. S.†

Gross Tons

	1958	1957
Jan.	7,605,229	11,525,704
Feb.	6,484,480	10,441,687
Mar.	6,947,341	11,295,587
Apr.	5,933,695	10,686 969
May	6,216,820	10,938.663
June	6,674,027	10,451,125
July	6,623,664	10,655,416
Aug.	7,418,632	10,903,792
Sept.	7,899,781	10,481,434
Oct.	9,127,828	10,272.452
Nov.	.....	9,065,704
Dec.	.....	8,223,230

†Includes ore agglomerates.
American Iron Ore Association.

Lake Superior Iron Ore

Shipments from Upper Lake Ports

Gross Tons

	1958	1957	1956
Jan.	none	none	none
Feb.	none	none	none
Mar.	none	none	none
Apr.	62,560	3,986,614	5,674,112
May	4,060,601	12 727,659	12,553,857
June	8,040,973	13.597,376	12,939,316
July	9,589,436	14,211,819	2,665,548
Aug.	9,324,061	13,172,356	8,045,028
Sept.	8,705,886	11,828,076	12,745,097
Oct.	8,480,635	11,005,644	12,628,477
Nov.	4,528,563	4,066,829	8,801,168
Dec.	75,313	19.498	1,580,424
Totals	52,868,028	84,815,871	77,633,027

American Iron Ore Association.

Fluorspar

Net Tons

1958	Production	Imports	Consumption	Stocks†
1st Qtr	62.293	86,034	124.587	228,554
2nd Qtr	90.151	83.497	121,173	207,068

YEARLY TOTALS

	Production	Imports	Consumption	Stocks†
1957	322,600	631,367	644,688	245.319
1956	306.500	485.552	621.354	211.473
1955	268.400	363.420	570.261	164.016
1954	245.600	293,320	480.374	354.326
1953	318.000	359.560	586.798	276.983
1952	331.300	352.503	520.197	401.802
1951	347.024	181.275	497.012	182.409
1950	301.510	164.634	426.121	183.723

U. S. Bureau of Mines †End of period.

Scrap Consumption by Industries

Thousands of Net Tons

	Makers of Steel Ingots and Castings[1]		Makers of Steel Castings[2]		Iron Foundries and Misc.		Totals†	
	1958	1957	1958	1957	1958	1957	1958	1957
Jan.	3,498	6.063	222	324	841	1,040	4.561	7.427
Feb.	2,977	5,510	196	299	737	954	3,910	6 763
Mar.	3.218	5,773	198	307	748	970	4,164	7.049
Apr.	2,930	5,208	184	311	727	995	3,841	6.514
May	3,436	5,166	170	306	720	972	4,326	6.444
June	4,031	4,925	169	278	737	880	4,938	6.082
July	3.389	4,496	130	221	644	769	4,163	5.485
Aug.	3,825	4,758	167	285	716	892	4,707	5.935
Sept.	3,988	4.510	182	272	839	857	5,009	5 639
Oct.	....	4,710	...	283	...	981	....	5.974
Nov.	....	4,350	...	236	...	855	....	5.441
Dec.	....	3,784	...	219	...	769	....	4,773

[1]Includes only those castings made by companies producing steel ingots.
[2]Excludes companies that produce both steel castings and steel ingots.
†Totals are not precise because of rounded figures.
U. S. Bureau of Mines.

Coke Production

Net Tons

	Oven	Beehive	Totals
1958*	.....	.....	54.000.000
Jan.	4,714.610	47.440	4,762.050
Feb.	4,041.122	37,606	4,078,728
Mar.	4,301,831	41.495	4.343 326
Apr.	3,802.015	35.025	3.837.040
May	3,862.390	36,614	3,899,004
June	3,889.400	45 080	3.934.480
July	3,927,718	29.512	3.957,230
Aug.	4,275,708	38,940	4.314.648
Sept.	4,450,171	54.210	4,504,381
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1957	73.754.114	2,014,655	75.768,769
Jan.	6.604.384	253.256	6,857.640
Feb.	5,965 912	245 933	6.211,845
Mar.	6 631.662	262.459	6,894.121
Apr.	6.221.182	215 091	6.436 273
May	6,451.371	181.148	6.632.519
June	6 207.022	155.313	6.362.335
July	6.364.026	137.240	6.501.266
Aug.	6.369.395	150.578	6.519.973
Sept.	6.159.282	137.237	6.296.519
Oct.	6.157.497	118.070	6.275.567
Nov.	5.531.945	83.801	5.615.746
Dec.	5.090.436	74.529	5,164.965

YEARLY TOTALS

	Oven	Beehive	Totals
1958*	.....	.....	54.000.000
1957	73.754.114	2.014 655	75.768.769
1956	71.936 499	2.443.957	74.380.456
1955	73.584.214	1.717.612	75.301.826
1954	59.061.442	601.054	59.662.496
1953	73.593.528	5.243.329	78.836,857
1952	63.850.115	4.403.994	68.254.109
1951	71.987.172	7.343.530	79.330.702
1950	66.890.618	5.827.420	72.718.038
1949	60.222.481	3.414.948	63.637.429

*Estimated.
U. S. Bureau of Mines.

Iron & Steel Scrap

Thousands of Net Tons

	Consumption		Stocks†	
	1958	1957	1958	1957
Jan.	4.561	7.427	8.906	7.312
Feb.	3.910	6.763	8.906	7,306
Mar.	4.164	7.049	9.060	7,361
Apr.	3.841	6.514	9.239	7.376
May	4.326	6.444	9.124	7.307
June	4.938	6.082	8.807	7.309
July	4.163	5.485	8.876	7.866
Aug.	4.707	5.935	8.903	8.393
Sept.	5.008	5.638	9.015	8.895
Oct.	....	5.974	....	9.112
Nov.	....	5.442	....	8.968
Dec.	....	4.795	....	8.949

MONTHLY AVERAGES

Consumption		Consumers' Stocks†	
1958*	4.700	1958*	8.990
1957	6.129	1957	8.013
1956	6.693	1956	7.002
1955	6.781	1955	7.259
1954	5.113	1954	6.689
1953	6.442	1953	6.738
1952	5.752	1952	6.103
1951	6.395	1951	4.472
1950	5.742	1950	5.272
1949	4.528	1949	5.631
1948	5.414	1948	4.980

†End of month. *Estimated.
U. S. Bureau of Mines.

Refractories†

(Shipments in Thousands of Dollars)

1958	Clay Refractories	Nonclay Refractories	Total Refractories
1st Qtr.	35.988	45.681	81.669
2nd Qtr.	36.155	48.322	84.477
3rd Qtr.	40.631	55.902	96.533
1957	207.640	253.668	461.308
1956	208.608	210.102	418.710
1955	181.076	187.417	368.493
1954	129.086	127.621	256.707
1953	159.663	164.704	324.367
1952	161.092	139.154	300.246
1951	171.086	155.756	326.842
1950	126.686	111.971	238,657

†Figures do not include dead-burned magnesia and magnesite or dead-burned dolomite for 1954-56.
U. S. Bureau of the Census.

U. S. Electricity Production Capacity

Thousands of Kilowatts

1958			
January	129,701	July	135,062
Feburary	129,862	August	136,192
March	130,356	September	136,993
April	131,125	October	.....
May	132,924	November	.....
June	134,332	December	.....

CAPACITIES AT YEAREND

1957	128,737	1953	91,502
1956	120,697	1952	82,226
1955	114,472	1951	75,775
1954	102,592	1950	68,919
1949	63,100		
1948	56,560		
1947	52,322		
1946	50,317		

Edison Electric Institute.

Liquefied Petroleum Gas Consumption in Steel Industry

Gallons

	Heating and Annealing	All Other	Totals
1957	8,761,323	2,537,219	11,298,542
1956	9,157,271	2,452,896	11,610,167
1955	10,705,474	1,595,174	12,300,648

American Iron & Steel Institute.

ELECTRICITY OUTPUT

Total Electric Utility Industry
Millions of Kilowatt-Hours

1958—By Weeks

Jan. 4	11,692	May 3	11,251	Sept. 6	12,025
Jan. 11	12,506	May 10	11,315	Sept. 13	12,248
Jan. 18	12,400	May 17	11,257	Sept. 20	12,240
Jan. 25	12,399	May 24	11,316	Sept. 27	12,342
Feb. 1	12,238	May 31	11,155	Oct. 4	12,111
Feb. 8	12,289	June 7	11,681	Oct. 11	12,067
Feb. 15	12,417	June 14	12,109	Oct. 18	12,048
Feb. 22	12,338	June 21	11,941	Oct. 25	12,174
Mar. 1	11,803	June 28	11,757	Nov. 1	12,330
Mar. 8	11,793	July 5	11,210	Nov. 8	12,311
Mar. 15	11,880	July 12	11,851	Nov. 15	12,378
Mar. 22	11,756	July 19	12,257	Nov. 22	12,579
Mar. 29	11,645	July 26	12,319	Nov. 29	12,274
Apr. 5	11,326	Aug. 2	12,619	Dec. 6	13,017
Apr. 12	11,307	Aug. 9	12,707	Dec. 13	.....
Apr. 19	11,107	Aug. 16	12,851	Dec. 20	.....
Apr. 26	11,206	Aug. 23	12,486	Dec. 27	.....
		Aug. 30	12,272		

Edison Electric Institute.

YEARLY TOTALS

Millions of Kilowatt-Hours

1958*	640,700
1957	631,380
1956	600,668
1955	547,038
1954	471,686
1953	442,665
1952	399,224
1951	370,673
1950	329,141
1949	291,100
1948	282,698

*Estimated.
Federal Power Commission.

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Totals
1957	1,320,545	644,698	1,965,243
1956	1,540,835	720,794	2,261,629
1955	1,584,752	693,090	2,277,842
1954	1,239,305	558,989	1,798,294
1953	1,708,471	684,745	2,393,216
1952	1,579,960	660,165	2,240,125
1951	1,781,660	742,050	2,523,710

American Iron & Steel Institute.

Industrial Coal Stocks

(Bituminous)

Thousands of Net Tons at End of Month

	1958	1957		1958	1957
Jan.	77,355	73,182	July	71,144	75,260
Feb.	72,264	71,508	Aug.	72,256	77,889
Mar.	70,922	72,160	Sept.	74,020	80,021
Apr.	71,296	73,548	Oct.	.....	81,580
May	72,613	76,307	Nov.	.....	81,521
June	74,646	78,531	Dec.	.....	80,779

U. S. Bureau of Mines.

Natural Gas Consumption in Steel Industry

Millions of Cubic Feet

	Melting Furnaces	Heating, Annealing	All Other	Totals
1957	68,029	154,440	58,665	281,134
1956	60,615	164,057	59,032	283,704
1955	57,640	163,742	52,302	273,684
1954	40,302	194,888	44,869	280,059
1953	44,765	139,339	39,794	223,898
1952	40,096	125,842	43,051	208,989
1951	44,669	126,380	35,748	206,797

American Iron & Steel Institute.

Bituminous Coal Consumption†

Thousands of Net Tons

	Industrial Consumption 1958	1957	Retail Deliveries 1958	1957	Totals 1958	1957
Jan.	31,778	37,032	5,006	5,778	36,784	42,810
Feb.	28,622	31,759	5,031	4,233	33,653	35,992
Mar.	28,692	33,683	3,627	3,598	32,319	37,281
Apr.	24,932	30,796	2,198	2,573	27,130	33,369
May	24,477	30,628	1,567	1,580	26,044	32,208
June	24,199	29,353	1,451	1,417	25,650	30,770
July	24,824	29,380	1,454	1,430	26,278	30,810
Aug.	26,141	30,846	2,063	2,042	28,204	32,888
Sept.	26,649	29,839	2,826	2,469	29,475	32,308
Oct.	.....	32,186	....	3,510	.....	35,696
Nov.	.....	31,169	....	3,159	.....	34,328
Dec.	.....	31,242	....	3,923	.....	35,165

†Data for 1957 and 1958 are not exactly comparable with those for 1956 and prior years because of a change in the benchmark.
U. S. Office of Business Economics.

Monthly Averages

	Industrial Consumption	Retail Deliveries	Totals
1957	31,493	2,974	34,467
1956	31,970	4,094	36,064
1955	30,804	4,480	35,284
1954	25,869	4,385	30,254
1953	30,459	5,108	35,567
1952	29,197	5,699	34,896
1951	32,698	6,378	39,075
1950	30,633	7,217	37,850
1949	29,603	7,525	37,128

U. S. Bureau of Mines.

Natural Gas Sales

Millions of Therms

1958	Residential	Industrial, Commercial	Other	Totals
1st Qtr	11,832	12,345	953	25,130
2nd Qtr	5,608	11,296	650	17,554
1957	24,075	46,397	3,655	74,127
1956	22,255	43,798	2,297	68,350

American Gas Association.

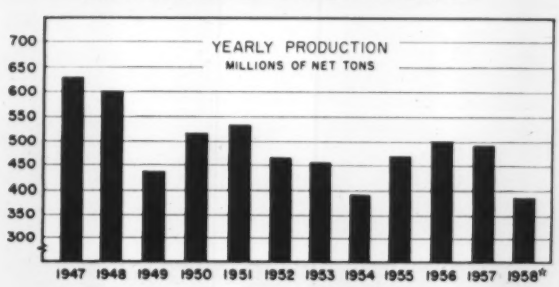
Oxygen Consumption in Steel Industry

(Millions of Cubic Feet)

	Purchased	Own Manufacture	Totals
1957	17,106	8,781	25,887
1956	15,837	8,036	23,873

American Iron & Steel Institute.

BITUMINOUS COAL OUTPUT



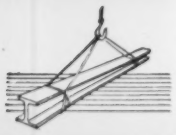
1958—By Weeks

Thousands of Net Tons

Jan. 4	7,025	May 3	6,350	Sept. 6	7,020
Jan. 11	8,790	May 10	6,250	Sept. 13	8,345
Jan. 18	8,440	May 17	7,270	Sept. 20	8,425
Jan. 25	8,285	May 24	7,220	Sept. 27	8,895
Feb. 1	8,120	May 31	7,140	Oct. 4	8,435
Feb. 8	7,460	June 7	7,775	Oct. 11	8,715
Feb. 15	7,965	June 14	8,300	Oct. 18	8,465
Feb. 22	6,790	June 21	8,915	Oct. 25	8,460
Mar. 1	8,310	June 28	8,930	Nov. 1	8,540
Mar. 8	8,100	July 5	1,330	Nov. 8	8,600
Mar. 15	7,635	July 12	1,320	Nov. 15	8,585
Mar. 22	7,440	July 19	7,510	Nov. 22	8,745
Mar. 29	7,290	July 26	7,855	Nov. 29	7,545
Apr. 5	6,200	Aug. 2	7,695	Dec. 6	....
Apr. 12	6,960	Aug. 9	7,965	Dec. 13	....
Apr. 19	7,080	Aug. 16	8,075	Dec. 20	....
Apr. 26	6,720	Aug. 23	8,280	Dec. 27	....
		Aug. 30	8,290		

U. S. Bureau of Mines.

*Estimated.



Construction

METALWORKING FACTS AND FIGURES

CONSTRUCTION VALUATION

Thousands of Dollars

	Totals		Public Works, Utilities		Residential and Nonresidential	
	1958	1957	1958	1957	1958	1957
Jan.	2,066,059	2,299,554	529,865	568,820	1,536,194	1,730,734
Feb.	1,953,422	2,161,009	475,321	465,485	1,478,101	1,695,524
Mar.	2,721,228	3,077,977	683,570	878,268	2,037,658	2,199,729
Apr.	2,881,011	2,776,431	682,998	706,699	2,198,013	2,069,732
May	3,402,575	3,399,528	932,318	982,683	2,470,257	2,416,845
June	3,819,582	3,243,486	1,479,307	901,989	2,340,275	2,341,497
July	3,607,056	2,900,681	973,579	653,086	2,633,477	2,247,595
Aug.	3,466,576	2,817,966	937,062	526,188	2,529,514	2,291,778
Sept.	3,215,919	2,624,928	863,415	532,770	2,352,504	2,092,158
Oct.	3,309,024	2,613,791	759,190	538,192	2,549,834	2,075,599
Nov.	.....	2,370,699	.....	562,228	.....	1,808,471
Dec.	.....	1,982,342	.....	524,850	.....	1,457,492
Totals	36,045,000*	32,268,392	.....	7,841,258	.....	24,427,154

F. W. Dodge Corp. *Estimated.

CONSTRUCTION PUT IN PLACE

Millions of Dollars

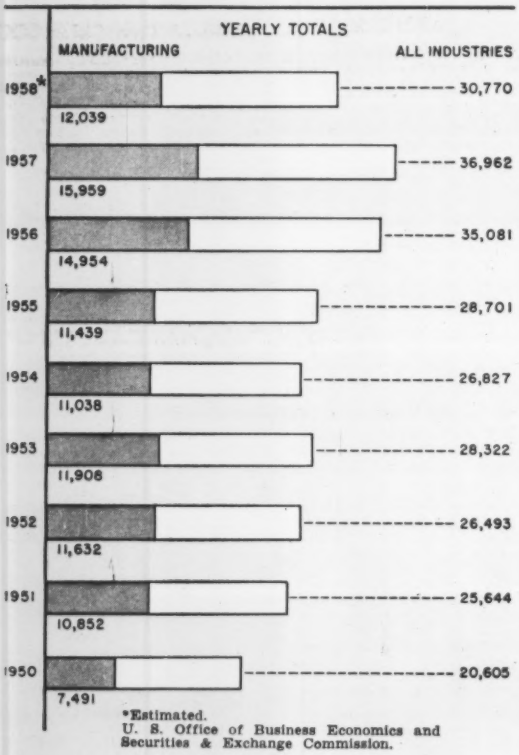
		PRIVATE				
	TOTALS	Nonfarm Residential	Nonresidential	Farm	Public Utility	All Other	PUBLIC
1958							
11 Mo.	45,329	16,202	7,998	1,509	5,344	173	14,103
Jan.	3,380	1,165	746	101	411	12	945
Feb.	3,153	1,083	705	105	397	11	852
Mar.	3,400	1,177	689	114	450	12	958
Apr.	3,703	1,288	677	127	478	13	1,120
May	4,054	1,407	698	147	504	17	1,281
June	4,397	1,539	735	162	524	19	1,418
July	4,642	1,641	754	171	542	20	1,514
Aug.	4,707	1,708	743	173	512	17	1,554
Sept.	4,751	1,732	741	161	520	18	1,579
Oct.	4,726	1,753	750	134	519	17	1,553
Nov.	4,416	1,709	760	114	487	17	1,329
Dec.	....	....	...	...	....	..	....
1957	47,288	16,625	9,134	1,550	5,778	196	14,005
1956	44,258	15,339	8,801	1,500	5,065	120	13,433

U. S. Departments of Commerce and Labor.

NEW PLANT & EQUIPMENT EXPENDITURES

Millions of Dollars
(Figures do not necessarily add to totals, due to rounding.)

	Manufacturing		All Industries	
	1958	1957	1958	1957
1st Quarter	2,898	3,505	7,325	8,282
2nd Quarter	3,235	4,183	8,262	9,590
3rd Quarter	2,987	4,010	7,700	9,357
4th Quarter	2,919	4,261	7,483	9,733
Totals	12,039*	15,959	30,770*	36,962



*Estimated.
U. S. Office of Business Economics and Securities & Exchange Commission.

NEW HOUSES STARTED

(Permanent Nonfarm Dwellings—Cost Estimated in Thousands of Dollars)

	Number		Cost	
	1958	1957	1958	1957
January	67,900	64,700	792,427	752,234
February	66,100	65,800	781,091	784,019
March	81,400	87,000	973,330	1,073,205
April	99,100	93,700	1,196,950	1,152,166
May	108,500	103,000	1,269,429	1,264,385
June	112,900	99,900	1,399,023	1,228,980
July	112,800	97,800	1,354,560	1,198,141
August	119,000	100,000	.....	1,207,763
September	118,000	91,900	.....	1,129,374
October	111,000	97,000	.....	1,195,309
November	.....	78,200	.....	946,481
December	.....	63,400	.....	761,938
Totals	1,170,000*	1,041,900	.....	$12,693,995

YEARLY TOTALS

	Number	Cost		Number	Cost
1958*	1,170,000	.....	1954	1,220,440	12,478,237
1957	1,041,900	12,693,995	1953	1,103,800	10,488,003
1956	1,118,100	13,077,027	1952	1,127,000	10,208,983
1955	1,328,900	14,514,647	1951	1,091,300	9,800,892

U. S. Bureau of Labor Statistics. *Estimated.

FABRICATED STRUCTURAL STEEL

Tons

	Orders Placed			Shipments		
	1958	1957	1956	1958	1957	1956
January	162,158	320,408	496,570	316,742	290,076	306,176
February	185,646	294,141	376,075	282,576	318,971	340,540
March	195,970	318,935	433,455	336,598	342,451	373,445
April	208,161	403,576	440,635	323,574	362,192	348,000
May	224,308	331,227	422,353	328,180	377,304	349,984
June	286,798	247,152	397,281	329,240	384,724	332,814
July	330,890	213,175	334,514	290,856	312,486	201,868
August	225,768	183,520	315,105	298,012	383,785	242,092
September	255,584	221,043	288,424	313,701	338,679	289,648
October	259,016	181,337	337,673	307,080	384,797	341,712
November	.....	217,959	411,195	.....	334,083	320,562
December	.....	140,706	482,890	.....	320,210	333,260
Totals	.....	3,073,179	4,736,170	.....	4,179,708	3,780,101

	Orders Placed	Shipments
1955	4,651,312	3,659,353
1954	3,161,611	3,979,096

American Institute of Steel Construction.

Industrial Building Cost Index

(1914=100)

	1958	1957	1956	1955	1954	1953
First Quarter	n.a.	n.a.	405	396	393	383
Second Quarter	448	455	421	397	393	385
Third Quarter	...	456	441	399	395	392
Fourth Quarter	...	452	n.a.	401	396	392

QUARTERLY AVERAGES

1958..	n.a.	1955..	398	1952..	381	1949..	312	1946..	279
1957..	n.a.	1954..	394	1951..	396	1948..	321	1945..	236
1956..	n.a.	1953..	388	1950..	321	1947..	304	1944..	227

Aberthaw Co. n.a.=not available. *Estimated.

Working proof of Superior stainless quality—*the year around*

Superior

STAINLESS STRIP STEEL

Out front, and ever-bright—looking its best when the weather is worst—Superior Stainless in the millions of windshield wiper assemblies on today's cars speaks for *enduring quality*. The stainless strip is made right to behave right—uniform as can be, from coil to coil. • There's a Superior grade to meet *your* application in every particular. Write.

Superior Steel

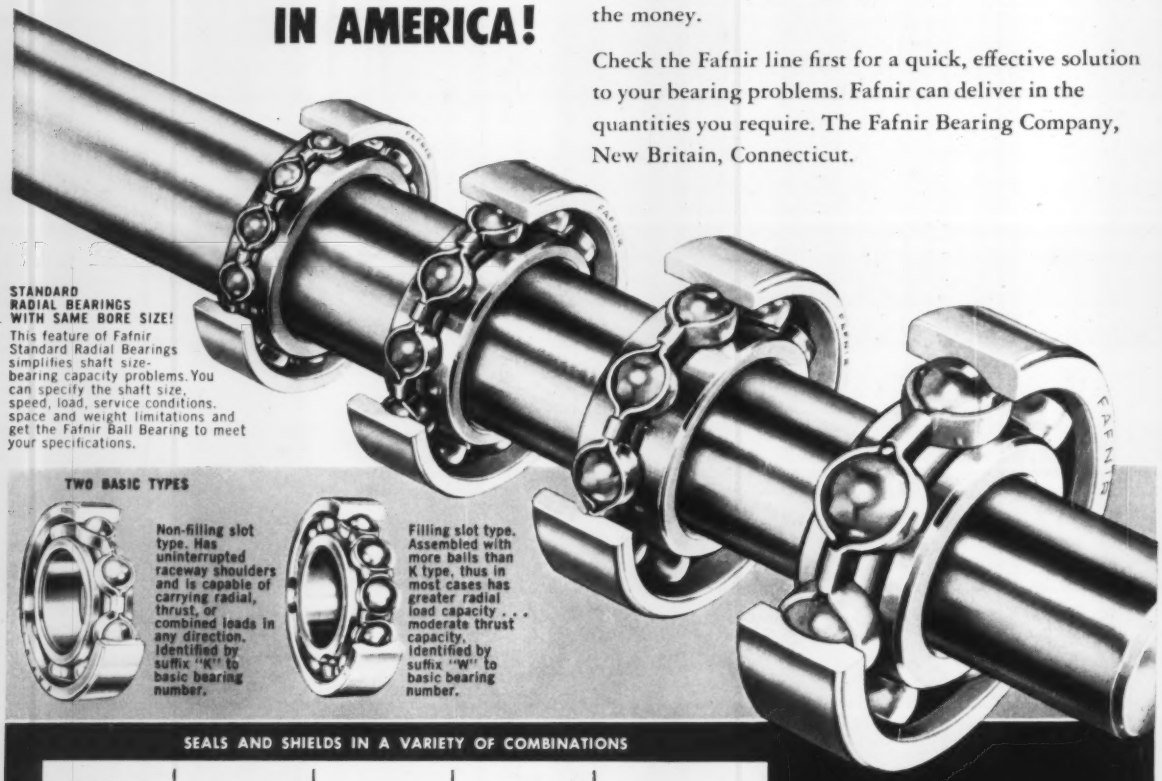
CARNEGIE, PENNSYLVANIA

For the most effective answers to your bearing problems...

FAFNIR OFFERS THE MOST COMPLETE LINE OF BALL BEARINGS IN AMERICA!

Whatever your bearing needs, your best bet is Fafnir. The reason . . . Fafnir makes America's most complete line of ball bearings, ranging from standard radial to custom-made jet engine types. Various tolerances and combinations of seals and shields enable Fafnir to supply the best bearing for the purpose — the *most* bearing for the money.

Check the Fafnir line first for a quick, effective solution to your bearing problems. Fafnir can deliver in the quantities you require. The Fafnir Bearing Company, New Britain, Connecticut.



STANDARD RADIAL BEARINGS WITH SAME BORE SIZE!

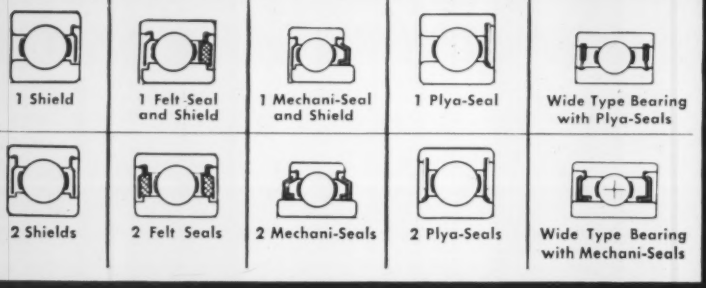
This feature of Fafnir Standard Radial Bearings simplifies shaft size-bearing capacity problems. You can specify the shaft size, speed, load, service conditions, space and weight limitations and get the Fafnir Ball Bearing to meet your specifications.

TWO BASIC TYPES

Non-filling slot type. Has uninterrupted raceway shoulders and is capable of carrying radial, thrust, or combined loads in any direction. Identified by suffix "K" to basic bearing number.

Filling slot type. Assembled with more balls than K type, thus in most cases has greater radial load capacity . . . moderate thrust capacity. Identified by suffix "W" to basic bearing number.

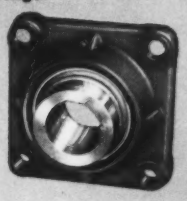
SEALS AND SHIELDS IN A VARIETY OF COMBINATIONS



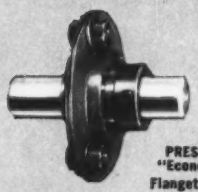
FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

A COMPLETE LINE OF HOUSED UNITS including:

CAST IRON PILLOW BLOCKS
LAK illustrated



CAST IRON FLANGE CARTRIDGES
LCJ illustrated



PRESSED STEEL "Economy" UNITS
Flangette illustrated

STEEL
January 5, 1959

This year's technological developments will play a vital role in the expanded economy of the "soaring sixties." To help you plan for the new decade, STEEL asked 285 authorities in metalworking and related fields to tell you what's coming and how you will benefit. Their comments are in 15 categories, indexed below by page number:

STEELMAKING 192
NONFERROUS METAL PRODUCTION .. 216
CASTING 234
MATERIALS AND METALLURGY 242
HEAT TREATING 262
INSPECTION AND TESTING 278
DRIVES AND CONTROLS 285
MACHINING 294
TOOLING AND GAGING 329
FORMING 340
CLEANING AND FINISHING 354
JOINING AND ASSEMBLY 362
HANDLING AND PACKAGING 374
LUBRICATION 383
SERVICE AND MAINTENANCE 391

STEELMAKING

NONFERROUS METAL PRODUCTION

CASTING

MATERIALS AND METALLURGY

1959 FORUM ON TECHNICAL PROGRESS

HIGHLIGHTS

STEELMAKING— Authorities are enthusiastic about oxygen, basic open hearths, and increased sinter burdens. But there's an interesting undertone: Can we justify the traditional blast furnace-open hearth combination? Some feel that steel would do better costwise by concentrating on other methods like direct reduction, beneficiation, and electrics. One comment (J. Byron Jones, Page 363) says ultrasonic energy applied to a molten bath can produce hot strip coatings of better quality at less cost.

NONFERROUS METAL PRODUCTION— Producers and fabricators of nonferrous metals see 1959 as a good year. Greater production capacity and technological developments point to increased uses for the metals. Aluminum consumption should approach 4 million tons. New high temperature alloys and lower prices will aid the growth of titanium. Continuous casting will improve brass mill goods.

CASTING— Higher mechanical properties across the board—this is the nearly universal goal for casting development. Added to it: Closer tolerances, thinner sections, and better surface finishes. Vacuum diecasting is a favorite to pay off commercially. Shell molding, air-set cores, and CO_2 molds and cores will blossom. Both investment and plastic-mold casting methods are on close-tolerance jobs. Aluminum-silicon alloys are being considered for the diecast aluminum engine blocks.

MATERIALS AND METALLURGY—Metallurgists are concentrating on materials to meet the requirements of the rapidly advancing Space Age. The high melting point, refractory metals are getting most of their attention. Vacuum melting has become firmly established as a technique for upgrading ordinary steels are well as the superalloys. But it still has phenomenal growth potential. The metallurgical developments of the next decade promise to all but obscure what has gone before.

HEAT TREATING— The advent of the Space Age has had repercussions in heat treating, too. Furnace builders are designing units for higher temperatures and automatic operation. More use of atmospheres is predicted. Static devices will get more play in heat treat control, particularly with induction units. A new instantaneous heat system, called Luminous Wall, may find more uses this year.

INSPECTION AND TESTING— These will be the inspection and testing newsmakers during the coming year, say our authorities: Microhardness devices will check and sort workpieces; more steel mills will use Magnaglo magnetic particle devices to find flaws in billets and products. Units that will prepare plant production data in 15 minutes are on the way.

DRIVES AND CONTROLS—Automatic operation still heads the list of developments in industrial drives and controls. You'll see more use of static power and control units, more digital programming equipment, and greater use of data logging gear. Better generators and adjustable speed drives are coming. New insulating material will widen the usefulness of electric motors.

MACHINING— Automation continues as the bright star of machining development—future work will be aimed at greater versatility so automation will fit more production lines. Building-block standards, for example, should get underway this year. Further work on numerical con-

trol should help cut equipment costs and simplify the sometimes tedious job of programming. The experts also talk about the need for radically new machining techniques to handle the tough metals—and there's need for refinements on newcomers like chemical milling, ultrasonics, and electromachining.

TOOLING AND GAGING— Ceramic cutting tools should move into the areas of heavier cuts on high strength steels and cast iron and finishing of steels harder than Rc 55. Throwaway cutting tools continue to take on new jobs. Look for gaging to move to finer tolerances—and watch for tape controlled gaging. Plastics, alloyed with metal powders or fibers for better wear resistance and stability, are in the offing.

FORMING— Explosive forming methods dominate the news. With at least one machine in production and several job shops in operation, you can expect dozens of new applications in the near future, the experts tell us. An ultrasonic manufacturer (Page 363) says drawing, extrusion, pressing, and similar squeeze forming can be done more easily with ultrasonic vibration.

CLEANING AND FINISHING—Thicker, crack-free chromium plating is on the way. Demand for finished aluminum is spurring development on both surface preparation and finishing. Look for further integration of cleaning and finishing lines—for example, vapor degreasing and metal finishing integration can cut costs 50 per cent. Ultrasonic cleaning will continue to gain—a solution for cavitation effects may come this year.

JOINING AND ASSEMBLY— Ultrasonic welding is coming of age. It will be kept in the spotlight because it's beginning to handle gages somewhat heavier than foils. Welding with explosives will gain some attention for applications like liners for pipes handling corrosive liquors. High frequency resistance welding will attract many whose products require a narrow heat-affected zone.

HANDLING & PACKAGING— Power tools will be used more in the handling and packaging of materials this year and in the next decade. Better rust preventives will protect ferrous metal parts, in process or packaged for shipment. More extensive use of automatic cranes and conveyors will stimulate the continuous flow of goods, from raw materials to finished products, on more efficient production lines.

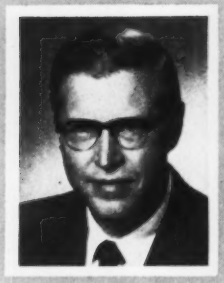
LUBRICATION— Refractory and reactive metals will be used more this year and in the decade to follow. There will be greater demand for rolling, machining, and operating lubricants that are resistant to heat and fire. More interest will be shown in lubricants that permit rolling and machining at lower temperatures and higher speeds, at the same time preventing rust and scale formation.

SERVICE & MAINTENANCE— This year, cathodic or electrical protection systems will find wider use in preserving metal that is under ground or under water. Also, there will be better protective coatings—some that are applied hot, and others that are applied cold and allowed to set chemically. In the field of water treatment, new coagulants will do a better job of clarifying the water flowing to and from industrial plants. More attention will be given the recovery of valuable chemicals, such as the pickling liquor from steel mills.

W. R. LYSOBEY
Technical Service Manager
Air Reduction Sales Co., a division of
Air Reduction Co. Inc., New York

JOHN K. STEWART
Manager, Steel Mill Sales Div.
Air Products Inc., Allentown, Pa.

R. E. BIRCH
Director of Research, Harbison-
Walker Refractories Co., Pittsburgh



FRANK M. CASHIN
Vice President, General Manager
Kaiser Chemicals Div., Kaiser
Aluminum & Chemical Corp.
Oakland, Calif.

1959 FORUM ON TECHNICAL PROGRESS

Steelmaking

Solid Material Injection Slated for Wider Use

—W. R. LYSOBEY

• We look for ever increasing quantities of oxygen to be used in steelmaking operations. In roof lance operations, use of flame enrichment and top blown converters will increase. The growth curve for the consumption of oxygen per ton of steel shows no evidence of leveling off.

Injection of solid material into molten metal will continue to become more widespread. The technique was originally developed for desulfurizing pig iron with calcium carbide. Similar techniques are being employed for carburizing steel in open hearth and electric furnaces.

Expect to see the injection of reactive metals, reactive alloys, flux materials, and degasifiers.

Oxygen Technology Extends Usefulness of Open Hearth

—JOHN K. STEWART

• One of the great advances in steel will come during the next year or so: More widespread adoption of oxygen steelmaking—including the oxygen converter and, even more important, the American improvement, roof jet oxygen and combustion oxygen in open hearths.

With advances that our operators have made, it will be a long time before the open hearth is displaced. Oxygen use is limited to some extent by roof life. In some shops its usage is limited by charging, tapping, and teeming facilities. It will not be uncommon to see open hearth furnaces doubling production that was common five years ago.

We look for oxygen plants at almost every mill. It is a cheap bulk commodity as available as electric power, water, and fuel gas.

Direct ore reduction will continue to get attention. A new process provides a molten hot metal rather than cold synthetic scrap. It makes iron that is suitable for further refining in an oxygen converter.

Basic Open Hearth Roof Is Making Big Advances

—R. E. BIRCH

• Great progress was made in the basic open hearth roof in 1958. More than 70 are in service now. Of those yet to be built, about 12 will be fully suspended. The rest will be of sprung arch construction with positive holddowns and various methods of suspension.

Basic roofs installed last year will not be completed until April this year. By then practical answers to many theoretical questions will be found. The relative merits of chemically bonded magnesite-chrome and chrome-magnesite brick, both with internal plates, will be more clearly seen. Hard fired magnesite-chrome brick (reportedly favored by European operators) and metal cased magnesia-spinal brick will also have been evaluated.

Higher furnace temperatures and increased oxygen use are permitted by basic roofs with resulting longer furnace campaigns.

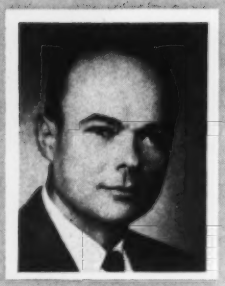
All Basic Open Hearth To Boost Basic Refractories

—FRANK M. CASHIN

• The all basic open hearth, the basic oxygen process, and the production of higher purity steels pose real challenges to the basic refractory industry.

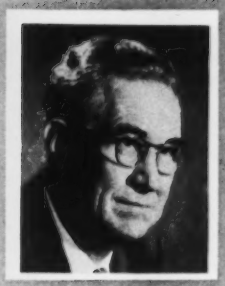
Because of the greater strength of basic refractories, it is feasible to use sprung roof construction for open hearths with either burned or unburned brick. We feel that 1959 will see considerable work done to develop a brick with greater resistance to iron oxides. Results so far are promising.

As the conversion to the all basic open hearth gets into full swing, we think the basic refractory market may increase 25 per cent. To meet the demand, re-



W. E. MILLER
Manager, Metal Rolling & Processing
Eng., General Electric Co.
Schenectady, N. Y.

C. R. AUSTIN
Manager, Steel Plant Development
Kaiser Engineers Div.
Henry J. Kaiser Co., Oakland, Calif.



HARRY W. McQUAID
Consultant
Cleveland

RUFUS EASTON
Manager, Continuous Casting Section
Engineering & Construction Div.
Koppers Co. Inc., Pittsburgh

fractory producers are enlarging their capacities.

Some experts expect that by 1965, the basic oxygen process will represent only 20 per cent of productive capacity. We don't see the same degree of improvement here as in the open hearth.

We have developed a hydration resistant, tar bonded dolomite brick which can be safely stored for some time. It permits centralized production facilities.

The trend toward the production of higher purity steels in vacuum and air induction furnaces demands purer refractories—those with higher magnesia content.

More Automation To Correlate Automatic Feedback Control

—W. E. MILLER

• A "Ring of the Future" (closed loop automation) promises to be the next great potentiality of automation. It will provide tighter management control of process performance. Gains will come not in moving the worker farther from the process, but in putting management closer. Longer runs at best theoretical efficiency and minimum raw material utilization with output of acceptable quality are assignments now delegated to process supervisors who too often are using incomplete information.

The modern control by automatic feedback is common today. The closed loop is frequently the symbol of automation. Many metal rolling processes are just a complex string of regulating system loops with all control points manually preselected. So much dependence is placed on human intelligence for control input or data taking that such processes cannot be called fully automated.

Progress toward higher levels of automaticity is being made through the application of new data processing techniques for serving the functions of data logging, computing, and programming. When enough can be learned of a process to connect proper logged information to a computer which has been instructed to perform proper operations on the data, the computer will be used to reprogram the process and close the outside loop.

One-Third of Our Steel Is Made by Oxygen Process

—C. R. AUSTIN

• At least one more L-D (oxygen) plant should come into production during 1959 and we believe several more will be initiated (two were started last year). In spite of slackened steel production, we are looking forward to an L-D output over 1 million tons in the U. S. This year should see production in the U. S. of nearly 3 million ingot tons.

Overseas, L-D growth has been more spectacular: Five million tons in 1958 (estimated).

The first installations emphasized low-carbon rimmed steel. Today's products include semikilled and killed steel of every carbon range and many low-alloy steels usually made in an open hearth. One German plant is making over 50 per cent of hot-topped steel. Another emphasizes the alloy grades. Several plants produce silicon steel for electrical sheets.

Specifications permitting the use of L-D steels in major product classifications reflect modern trends. The American Society for Testing Materials just printed about a dozen new ones.

Size of L-D heats is going up: Every day, 92 charge-ton heats are being made. Blowing times are 22 to 23 minutes. This year may see even that extended.

Blast Furnace Practices Are Being Evaluated

—HARRY W. McQUAID

• This will be a year of definite change in steelmaking thinking. The blast furnace-open hearth combination has finally become extremely difficult to justify as an economical method of producing tonnage grades of ingots.

Look for the trend in quick delivery orders to be away from the large open hearth to the electric furnace.

At the same time, any important increase in electric arc furnace capacity will result in a sharp increase in scrap demand and prices.

The trends lend impetus to the desire of every important steel producer to eventually replace the blast furnace with some sort of direct reduction. Serious work is being done in that field although most of it is built around the electric arc furnace.

Some relatively low cost programs will have to be reduced to practice or the whole economic future of the steel production plant looks uncertain.

The external treatment of blast furnace hot metal is quite desirable. The day will soon come when blast furnace production from present day equipment reaches its limit. No completely new blast furnace could be economically justified, so external treatment of hot metal, such as the rotary reactor, will have to be introduced soon.

Such an operation of the blast furnace with no concern about sulfur, silicon, phosphorus, or carbon should be a highly important contribution to our national production of iron and steel.

Maps Six Growth Areas For Direct Reduction

—RUFUS EASTON

• Direct reduction methods have enormous potential. Prototype plant operations last year showed their commercial attractiveness in many areas. Within the next two or three years, you may see new plants of these types:

Direct reduction plants using low cost ores and coals not suitable for the blast furnace. They will produce low carbon hot metal or pig for electric furnace

Steelmaking

PHILIP S. SAVAGE
Vice President, Donner-Hanna Coke Corp., Buffalo

DR. BRUCE S. OLD
Vice President, Arthur D. Little Inc. Cambridge, Mass.

WALTER M. PATTERSON
Electric Melting Consultant Allegheny Ludlum Steel Corp. Brackenridge, Pa.

T. J. MILHAUPT
Manager, Bulk Gas Sales Linde Co., a division of Union Carbide Corp., New York

steelmaking, or high carbon hot metal for oxygen steelmaking.

Direct reduction plants using the fines and flue dusts now handled by sintering machine and blast furnace.

Reduction plants which process complex ores into their component metallic elements. For example, an ore containing iron, nickel, and chromium can be processed into carbon steel, ferrochrome, and ferronickel.

Direct reduction plants supplying iron for foundry use.

Direct reduction plants processing ores into low carbon hot metal of low tramp element content for use in electric furnace manufacture of high quality steels.

Fully integrated plants with an annual capacity as low as 60,000 tons, based on local ore supplies. They will use direct reduction, electric steelmaking, continuous casting, and small finishing mills to make products such as reinforcing bars and small structurals.

Steel Will Emphasize Coke Quality, Ignore Chemicals

—PHILIP S. SAVAGE

• It is strange that in this chemical age, more thought and research has been devoted to producing coke with a minimum rather than a maximum of byproducts. I believe the trend will continue through 1959.

Unfortunately, it is economically sound, because coal, chemicals from petroleum, and imports principally from the Iron Curtain countries, have forced prices of most coal chemicals so low that it often does not pay to recover them.

The visits of our technical men to the USSR have accelerated the trend already started toward greater beneficiation of blast furnace materials. As a result, much more thought will be given to making better coke than in producing chemicals.

Coke practice has already been greatly improved at many blast furnace plants, and the trend will be to make better coke rather than more of it by using better coals and more skillful blending. I believe manufacturers will find a good market for coal handling and washing equipment that will meet this need.

Since the end of the war, we have seen three new beehive coke plants which recover no gas or chemicals. All coke oven designers are working on means to destroy ammonia in the gas rather than recovering it. I believe that it is sound to build coke ovens that recover only gas and tar, and that 1959 will see ovens of this type built. They should be simple and rugged, with a capital cost much less than that of the chemical type with complete recovery equipment.

Steelmakers Are Stepping Up Their Research Efforts

—DR. BRUCE S. OLD

• Steelmakers are putting increasing emphasis on research. Almost every major company has either expanded its research efforts or has plans to do so.

Such moves are timely. We face rising costs and increasing competition from other metals and materials. The competition is a direct result of research and development in other industries.

The most important new ingredient is greater emphasis on basic research.

Adequate Nickel Supplies To Spur Use of Stainless

—WALTER M. PATTERSON

• Missilemakers demand more exotic steels and alloys.

In general, electric furnace operators have met the challenge, but we are now confronted by requirements for newer, cleaner steels and alloys for use in outer space.

We also find that suppliers of ferroalloys, nickel, cobalt, and other metals are going all out to assist operators. New manufacturers have come into the field. We even find new ferroalloy sections in some melting organizations where members can discuss mutual problems and study processes.

The continuing increased use of oxygen in stainless melting is of tremendous importance to the electric furnace operator. Through its use, the term "charge chrome" has become quite a common designation. Many grades of such material are being made.

Nickel has again become plentiful, creating a free market which could limit the price of 18-8 scrap. Adequate nickel supply will increase the use of stainless in its many domestic, construction, and industrial applications.

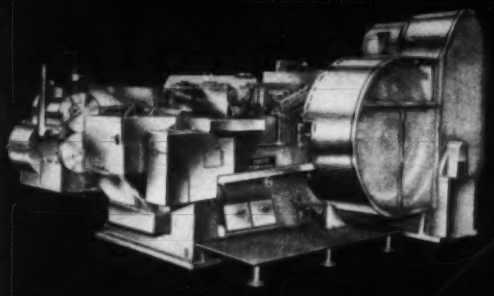
Use of Oxygen in Steelmaking Growing at 2½% Annual Rate

—T. J. MILHAUPT

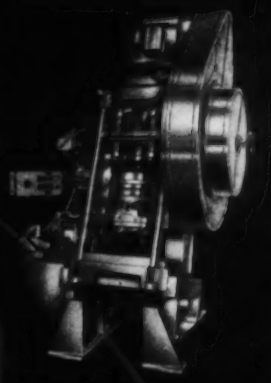
• Industry-wide estimates indicate that oxygen use in steel production is growing at the rate of about 2½ per cent per year. We expect the increase of oxygen use by Linde customers will be much more marked. Translating growth into cubic feet, we feel that by 1964 our customer average will be about 600 cu ft for each ton of steel produced. Contributing factors will be oxygen addition to existing processes, as well as production from new pneumatic facilities.

Whether oxygen use is part of a new process or added to economize, the common denominator is intermittent operation. Top blowing is not done continuously. Oxygen requirements for steel conditioning rise and fall as the scarfing machines are put on or taken off the

COLD HEADING
MACHINERY



POWER
PRESSES



WATERBURY
MACHINERY BUILDERS
FARREL

EYELET, SLITTER
& WIRE
MACHINERY

ROLLING MILL
MACHINERY

THE WATERBURY FARREL FOUNDRY & MACHINE CO.
DIVISION OF TEXTRON INC.
Waterbury, Connecticut • U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

WF-54

Steelmaking

PHILIP J. BERG
Manager, Engineering & Construction Sales Dept.
Dravo Corp., Pittsburgh

F. B. O'MARA
Marketing Manager, Electrode Products
National Carbon Co., a division of Union Carbide Corp., New York

GEORGE E. KOPETZ
Vice President, Production
Blaw-Knox Co., Pittsburgh

P. W. BAKARIAN
President and General Manager
R-N Corp., New York

line. High-volume scrap cutting is at best periodic.

Further flexibility of supply is shown by the Monongahela Valley oxygen plant now being built by Linde. The 1000-ton-a-day plant and its 7½ mile pipeline represent the largest single contract for oxygen supply to the steel industry. The plant will supply the high purity oxygen requirements of U. S. Steel's Duquesne, Edgar Thomson, Homestead, and National Tube Works. Facilities already installed are able to store a liquid equivalent of 10 million cu ft.

This Monongahela Valley system presages tomorrow's methods for oxygen supply: A reliable producing plant, gas storage, and facilities for liquid oxygen storage and conversion. Economy requires large scale production units at or near capacity. Shipped liquid oxygen will continue to be important as a bridge.

Users Start To Increase Size of Sinter Facilities

—PHILIP J. BERG

• In the years ahead, look for further advances in sintering in the U. S. and other parts of the world.

Last year, Dravo figured in sintering facilities which will boost annual output some 11 million tons.

Evidence of the demand: Jones & Laughlin Steel Corp.'s contract with us for a 13 ft 2 in. sinter strand (2410 sq ft) which will turn out 6500 tons per day. To our knowledge, it's the widest and largest equipment of this kind under construction in this country. (Two others the same size are being built in Australia.)

We have plans on the drawing boards for equipment with a hearth area of 3000 sq ft that will produce 9000 tons a day.

The trend to wider strands has been prompted by the results of present equipment (8 or 12 ft widths): Increased tonnage, reduced coke consumption, and the ability to add limestone (flux) to a charge before it reaches the furnace and hearth area.

Other advantages include: Lower initial investment per ton of output, less auxiliary equipment, and cheaper operating and maintenance costs.

Electric Furnaces Can Cut Cost of Adding Capacity

—F. B. O'MARA

• With the nation's industrial economy shifting rapidly back into high gear, steelmen are taking another look at anticipated capacities needed during the "soaring sixties."

Financing the expansion looms as the major problem, and once again the electric furnace is looking better and better to those concerned with the production of molten pig iron or steel from directly reduced iron.

Electric furnace pig as a hot charge and a variety of direct reduction methods for charging electrics will be integrated in steel operations.

Better Steels Are Needed By Processing Industries

—GEORGE E. KOPETZ

• The chemical, petroleum, and petrochemical industries urgently need better metals for pressurized processes in difficult temperature and corrosive situations. High pressures demand strength at temperatures and at corrosive conditions that make carbon steel entirely unsuitable. There is great need for better creep and rupture-strength properties of the 300 series stainless steels, or for the development of a new series of alloys of superior properties with excellent corrosion resistance at 1400 to 1800° F, and good resistance to the corrosive effects of sulfides and sulfur compounds generally at those temperatures. (The reaction is analogous to oxidation.)

Nonmetallic coatings will become important throughout the process industries. Those which protect against elevated temperature and corrosives will stretch applications of high strength metals to new levels.

Says Direct Reduction Is at Commercial Stage

—P. W. BAKARIAN

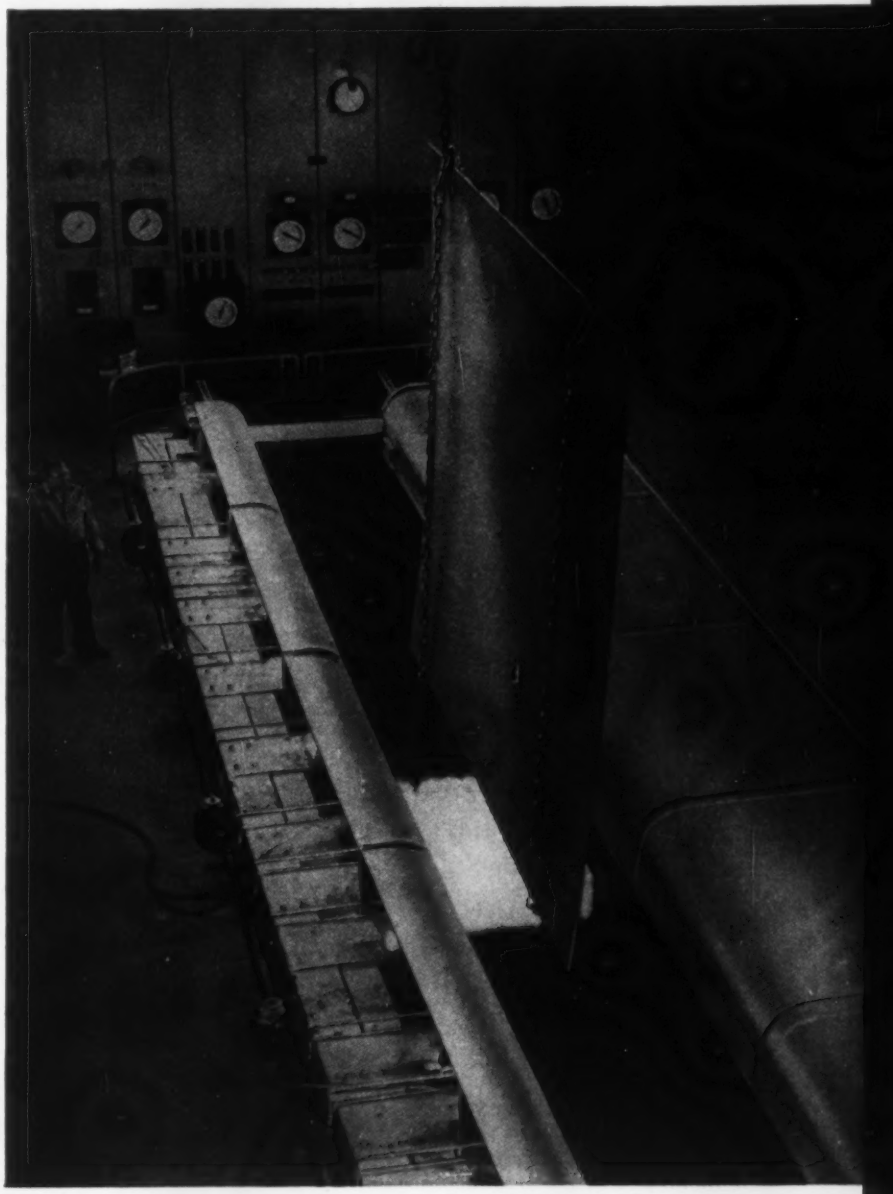
• The direct reduction method of converting high and low grade ores to metallic iron is ready for full scale commercial production.

Direct reduction should become a significant factor for new world iron capacity which will be programmed during the next ten years.

Such processes are being closely watched. They bridge the gap from ore to the electric or open hearth furnace in one step and produce iron of controlled quality. Iron can be produced from low grade ores which are widely available but presently not usable—containing up to 50 per cent silica and as little as 25 per cent iron. Low cost bituminous coals are used in the place of metallurgical coking coals.

More emphasis is being placed on circumventing blast furnace and coke oven costs. Management is pressing for more

When you need
BASIC CHEMICALS FOR METALS
look to General Chemical!



Here's why...

At practically every stage of metal-making and metal-working, you will find need for basic chemicals produced by General Chemical. These chemicals are readily available from a nation-wide network of plants and conveniently located stock points. You're sure of uniform quality, prompt deliveries, and experienced technical service whenever you need it. So specify *General* for all these basic chemicals:

Sulfuric Acid
Hydrochloric (Muriatic) Acid
Nitric Acid
Hydrofluoric Acid
Sodium Fluoride
Sodium Bifluoride
Trisodium Phosphate
Sodium Metasilicate
Oxalic Acid
Fluoboric Acid
Potassium Fluoborate
Sodium Fluoborate
Ammonium Fluoborate
Lead Fluoborate
Tin Fluoborate
Copper Fluoborate
Iron Fluoborate
Nickel Fluoborate
Cadmium Fluoborate
Baker & Adamson® Laboratory Reagents

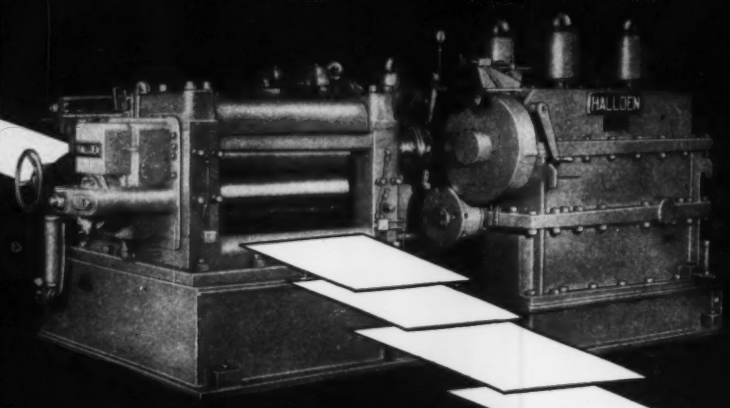
Basic Chemicals
for American Industry

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

NOW - A NEW "*Push Button*" FLYING SHEAR

NO DOWN TIME to change cut length or synchronization



A HALLDEN SHEAR EXCLUSIVE

A major improvement in high production continuous strip process in-line shearing.

Revolutionary new designs now permit synchronization adjustment AND gear changes to be made without stopping production. Changes in cut lengths are made in just seconds.

Hallden Shears can be furnished in processing lines built by leading machinery manufacturers the world around.

DESIGNED AND BUILT BY

HALLDEN

THE SHEARING SPECIALISTS

THE HALLDEN MACHINE COMPANY • THOMASTON, CONNECTICUT

Associates: The W. H. A. Robertson & Co. Ltd. Bedford, England

output from present combinations.

Three alternate cost approaches are being surveyed: New facilities plus the upgrading of low grade ores and agglomerating them for the blast furnace; the use of higher grade and more expensive foreign ores, which in many cases must be sintered for blast furnaces; and direct reduction.

Large scale plant tests indicate that improved ore yield, controlled composition of the iron briquets, and lower original plant investment are possible through direct reduction. Each geographic location is getting economic evaluation to compare direct reduction and a new blast furnace.

These factors are considered:

Location of low cost, noncoking coals.

Location of proper iron ores.

The need for ore upgrading and agglomeration.

Channeling high grade, coarse ore to present blast furnaces and using lesser grade ores in direct reduction processes.

Basic Oxygen Will Produce 15 Million Tons by 1961

—H. B. EMERICK

• Basic oxygen steelmaking is rapidly becoming a process of major importance. It combines advantages of the basic open hearth and bessemer converter, while eliminating many deficiencies.

Finished oxygen steel is quite low in phosphorus, sulfur, and nitrogen. It has excellent welding and cold forming properties.

Our new basic oxygen steel plant at Aliquippa, Pa., has two furnaces with a charge capacity of 65 tons. That has been increased routinely to 90 tons and experimentally to 120 tons, including 25 to 30 per cent scrap. Plant capacity is 750,000 ingot tons a year. (A production cycle gives 88 tons of finished steel per hour.)

Five plants using basic oxygen processes are now operating in Canada and the U. S., and others are under construction. World capacity will grow to nearly 15 million tons within the next two years. Continued development and improved design will make the process a strong competitor of the open hearth.

Oxygen Ups Output, Cuts Need for New Equipment

—N. P. GOSS

• Look for more oxygen this year in refining, especially in open hearths and electrics. That will increase the ton per hour output without new equipment.

Blast furnace output will be increased through more sinter and increased driving rate. Reducing lime and coke will also increase output, but will require external desiliconization and desulfurization. Several processes are under development.

The Perrin and Diamond rotary reactors are examples. Both quickly reduce silicon and sulfur from metal in one operation. Desiliconized iron from the blast furnace would be an ideal charge for electrics, and would reduce dependence on scrap. The ideal charge for electrics would be molten iron reduced with carbon in the Diamond rotary reactor. It would make the operation independent of the blast furnace (it can be a bottleneck).

Vacuum degassing will continue to grow. That's not the only profitable means for gas removal. Some new ones are under consideration.

As long as steel is poured into an ingot mold, piping, segregation, surface defects, nonuniformity of physicals, and excessive cropping will be problems. Surface conditioning alone costs in excess of $100 million each year.

The way out of that dilemma is to produce an ingot with a suitable surface. One way is continuous casting. Nearly perfect surfaces can be expected.

Exacting control of friction in continuous casting is still a problem. Several methods are under test to control it. Once that is conquered, surface defects, internal cracking, breakouts, and hangups will no longer be problems. Then you can expect greater use of continuous casting. Most logical fields for immediate application: Stainless and tool steels.

Hot extrusion could be greatly enhanced by continuous casting billets with excellent surfaces, cut to length at 2000° F, and glass coated in a furnace.

Here Are 18 Ways Progress Will Come to Steelmaking

—F. M. RICH

• Steel in the years to come will continue to replace traditional arts with precise science.

Probably the greatest attention will be paid to the automatic control of steel production and rolling.

Here is a priority list of improvements in iron, steel, and flat products production:

Improvement of raw materials and inclusion of fluxing agents.

Oxygen blast enrichment.

Humidified blast and higher blast temperatures.

More furnaces operating at high top pressure with increased top pressure levels.

Automation of blast furnace charging sequences and stove changing.

Better tapping hole refractories to permit a fluidized stock column through the casting period.

Steelmaking

H. B. EMERICK
Technical Services Director
Jones & Laughlin Steel Corp.
Pittsburgh

N. P. GOSS
Consultant
Cleveland

F. M. RICH
General Manager, Indiana Harbor Works, Inland Steel Co.
East Chicago, Ind.

Possible commercial adoption of new ways to reduce iron ores.

Improvement in open hearth production through oxygen, particularly in roof jets.

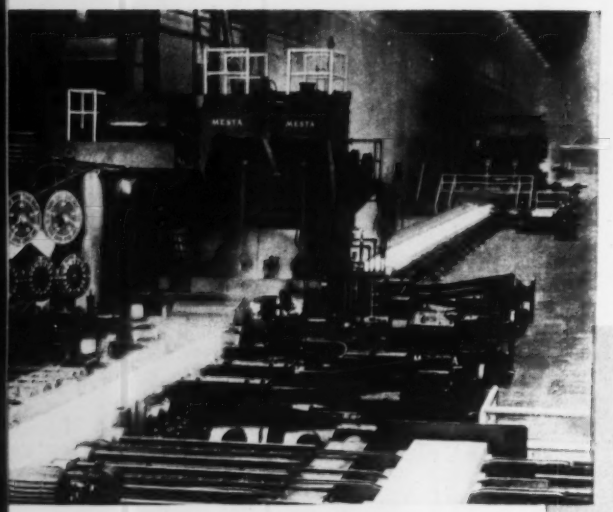
Better open hearth refractories and roofs to improve furnace availability.

More natural gas in some areas which will bring changes in furnace and burner design.

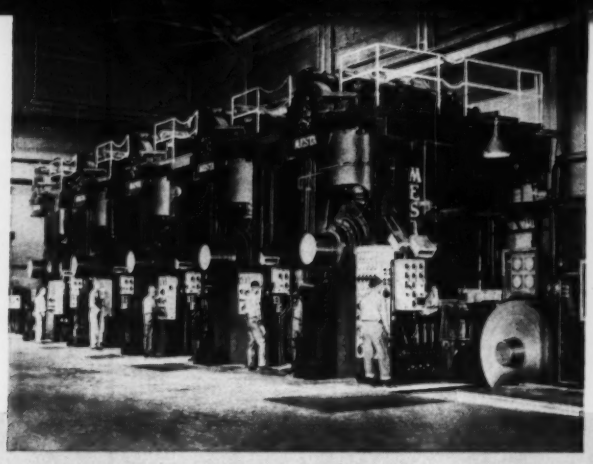
Oxygen steelmaking growth to at least 4.4 million tons by the end of 1959.

Completely automated slabbing mills.

(Please turn to Page 202)



Universal Reversing Roughing Mill and Vertical Edging Mill — Automatically Controlled — on a MESTA 44″ Hot Strip Mill



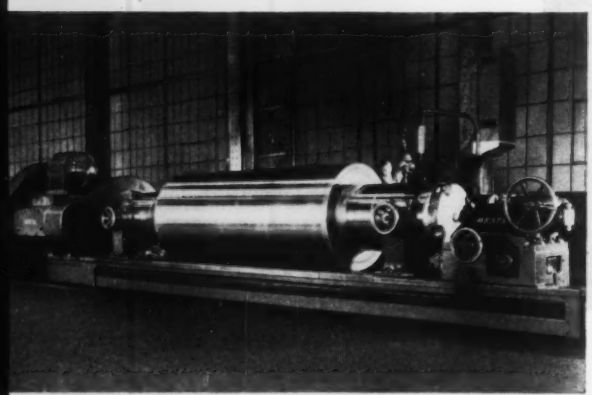
MESTA 48″ Four-High Five-Stand Tandem Cold Mill Rolling Strip Steel for Tin Plate in Coils

Six Finishing Stands with Three Vertical Edgers on a MESTA 44″ Four-High Hot Strip Mill

MESTA

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

In this, the 200th Anniversary of Pittsburgh, Mesta Machine Company is proud of its more than 60 years as a leader in the development, design, and manufacture of rolling mills and auxiliary processing equipment, forging presses, and heavy duty machinery for complete steel and aluminum plants. The name MESTA is a symbol of quality to these progressive industries here, and in other countries, in their goals to produce more and better products.

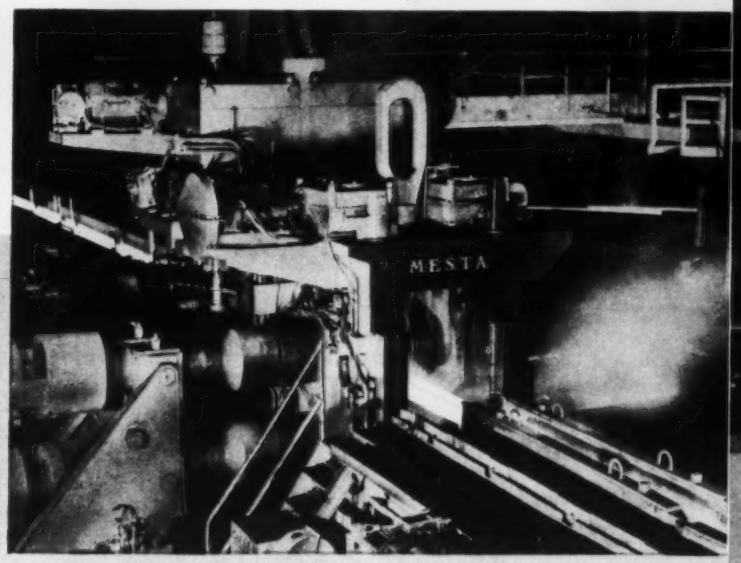


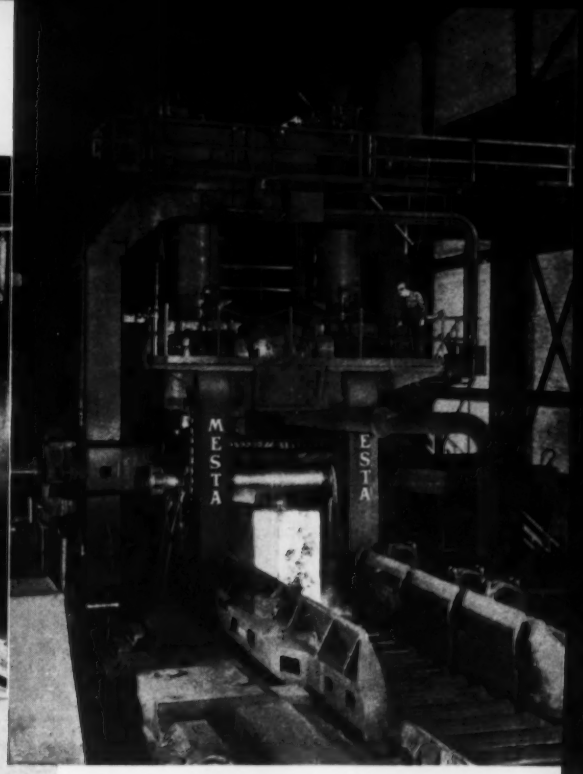
MESTA 60″ Travelling Wheel Type Heavy Duty Roll Grinder Finishing a Backing-Up Roll

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

MESTA Universal Structural Mill Rolling Wide Flange Beams
on the 44″ Universal Stand and the 34″ Edging Stand

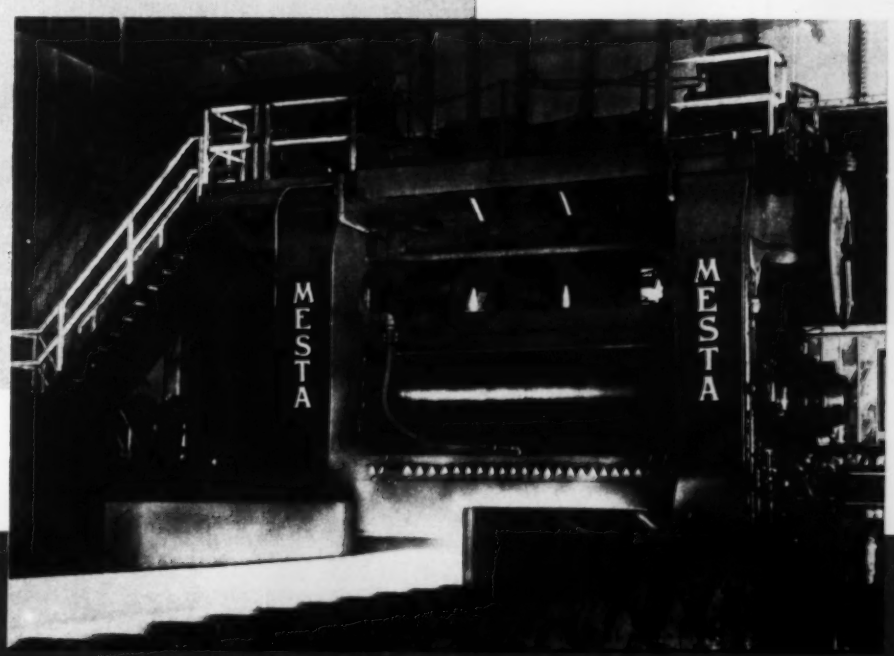




Rolling 20 Ton Ingots into Slabs
on a MESTA 45″ x 90″ Universal
Reversing Slabbing Mill

PITTSBURGH BICENTENNIAL
1758 — 1958

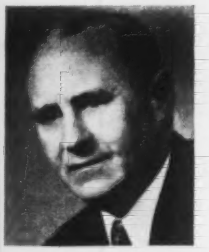
GATEWAY
TO THE
FUTURE



MESTA 160″ Four-High
Reversing Plate Mill

Steelmaking

LEO F. REINARTZ
Consultant, Armco Steel Corp.
Middletown, Ohio



HAROLD ROWEN
General Manager, Dwight-Lloyd Div.
McDowell Co. Inc., Cleveland

G. G. BEARD
President, United Engineering &
Foundry Co., Pittsburgh

(We are attempting to do this at Inland and feel that we'll be successful.)

Complete automation on hot strip mills through the rough and finishing stands.

Improvement of gage run-down on hot mill coils.

New controls on hot mill coilers (2200 and 2300 fpm) to eliminate telescoping.

More high speed tandem cold strip mills making coils of 1000 lb per inch of width.

Coils heat treated for vitreous enameling.

High speed electrolytic tinning lines becoming faster with automatic determination and recording of coating weight.

Electrolytic tin plate made in coils.

Steelmaking Modifications Up Unit Output Efficiency

—LEO F. REINARTZ

• High grade foreign iron ores will be imported in increasingly large tonnages. Taconite pellet production will increase.

More companies will install ore sizing and blending facilities. Limestone will also be crushed to uniform size.

Sintering of iron ore fines and flue dust will continue to grow. Quality will improve by controlled addition of ground limestone.

New sintering machines will be wider (up to 12 ft) and deeper beds will be used (up to 15 in.). Large, circular dry coolers will become popular.

Sometime in the future, blast furnace and coke oven gas may replace some of the coke now used.

New blast furnaces will have 28 to 31 ft hearths. Heating capacities will be higher. Blast temperatures approaching 1800° F will be used, with moisture running from 8 to 24 grains.

Tops will be reinforced for 18 to 20 lb pressures. Such furnaces should produce 3000 tons a day.

Some people may try an auxiliary set of small tuyeres above the regular ones near the top of the bosh to inject reformed natural gas, fuel oil, or coke oven gas with oxygen.

Several direct reduction processes are nearing the end of the pilot stage. The problem is now one of economics. Capital costs will be lower than those of the conventional coke oven-blast furnace design. Operating costs should equal those of the open hearth.

Through structural modifications, practically every open hearth furnace in the U. S. ten years old can produce 10 to 30 per cent more per year.

New furnaces will have capacities of 300 to 400 tons. To increase ingot tonnage, many old furnaces will be changed to an all-basic design. I predict that new ones will be all-basic.

More attention will be given to automatic combustion control and high velocity short flames.

The International Flame Research Committee has been doing good work with the open hearth. Its success will encourage American engineers to build models for improving fuel combustion.

I predict that new on-site oxygen production plants will increase. Oxygen consumption (now at 200 cu ft per ingot ton) will expand to 1000 cu ft in the next five years.

To obtain optimum results from oxygen methods, baths should be deepened, roofs raised, hearth areas increased, and all-basic furnace designs adopted.

Predicts Complete Burdens Of Self-Fluxing Sinter

—HAROLD ROWEN

• Complete burdens of self-fluxing sinter are definitely in the cards for ferrous industries, both here and abroad. The Swedes have proved its practicality; the Russians apparently are following suit.

Determined efforts to increase blast furnace production, to cut coke needs, to reduce flue dust losses, and to lower production costs have proved that presmelting beneficiation relieves the blast furnace workload. Results will be lower requirements for high grade coke.

The sinter machine will continue to play a major role, and a new science of sintering will evolve. The familiar burnerman will be replaced by a technician. He will preset mixes (moisture, fuel, and ignition) automatically. Oxidation or reduction of the sinter and burnthrough will be precisely controlled.

Such material mixes of uniform porosity and strength will lead to 75 per cent (or higher) furnace charges. More studies of movement in the blast furnace stack will eliminate the old fears of excessive hanging and scaffold formation.

Steelmen will consider crushing refractory lump ore and sintering it, to raise the smelting area and produce more iron.

Sintering people will play a bigger role in controlling the blast furnace charge. Fluxes will be added to the sintering machine burden in fine, more efficient grain sizes. Proper mixing will enable the use of fines without fear of increased flue dust since they will be "sintered in."

Sintering people can expect lubricated tight seals, maintenance of exhaust gas temperatures which will prevent duct and collector corrosion, control of process dusts, more and better instrumentation.

Sintering is being accepted as an integral, indispensable part of steelmaking.

Continuous Casting Slated For Intensive Study

—G. G. BEARD

• The steel industry will make strides in the mine-to-pig operations, involving ore beneficiation and sintering, coal cleaning and preparation, oxygen blow converters, and direct reduction of iron ore.

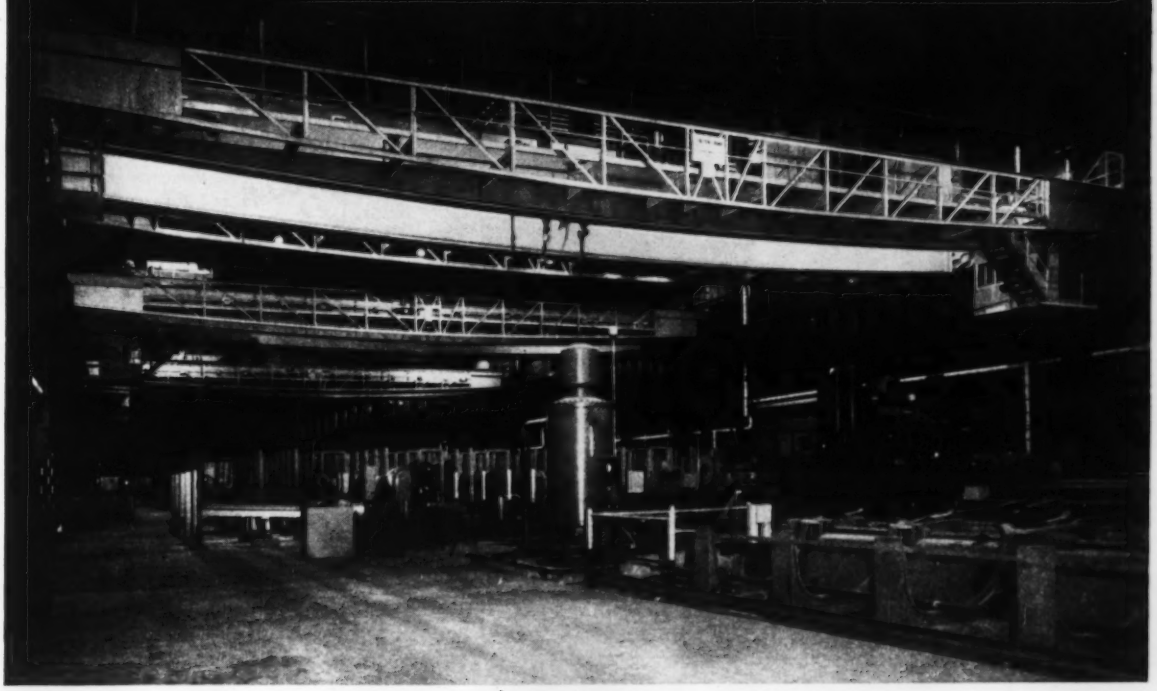
Continuous casting of ingots will justify concentrated study. Ten in. square alloy and silicon steel ingots and 6 in. by 25 in. stainless and carbon steel ingots are

AMERICA'S LARGEST STEEL MILLS USE BROWNING CRANES

Built to A. I. S. E.
Specifications or Your Own

For years, Victor R. Browning & Co. has devoted major time and study to the building of heavy duty mill cranes. The finest materials and workmanship go into the construction of these cranes. All shafts are of the highest quality alloy steel. All bearings are calculated with a proper life factor as required by the A. I. S. E. We will design to suit your special requirements or build to your specifications... Victor R. Browning & Co. also makes a complete line of trolleys which can be adapted to existing bridges.

VICTOR R. BROWNING & COMPANY, INC.
WILLOUGHBY (CLEVELAND), OHIO

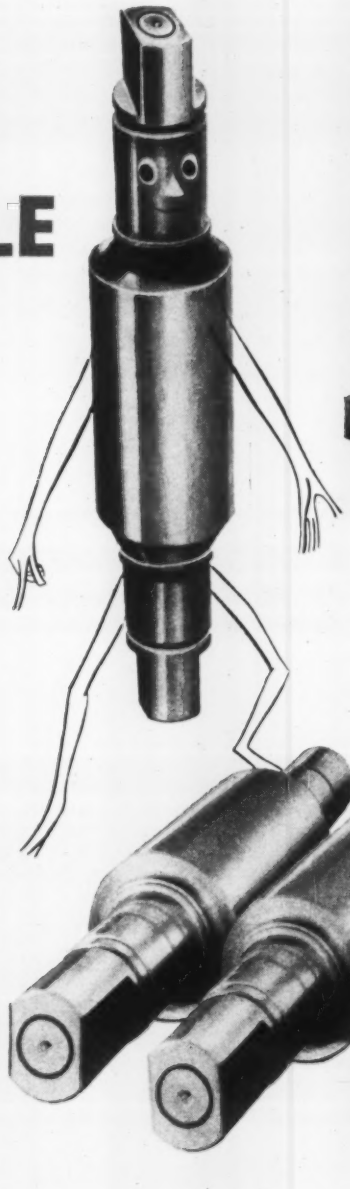


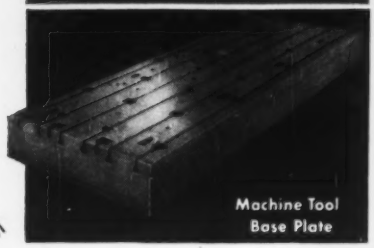
Introducing

Hyde Park's

MISTER

RED CIRCLE





ROLLS

Nickel Alloy Grain Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Nodular Iron Rolls

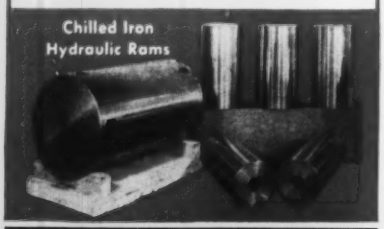
All Grades Nickel Alloy Iron Rolls for Hot and Cold Rolling

ROLLING MILL EQUIPMENT

Bar Mills
Merchant Mills
Roller Tables
Stretcher Levellers
Sheet Mill Shears
Special Machinery
Sheet and Strip Mills
Pinion Stands
Reduction Drives
Roll Lathes
Machine Work

CASTINGS

Furnace Castings
Heavy Die Castings
Bases
Housings
Machinery Castings
Slag Pots
Heavy Tool Castings
Floor Plates



No Production Headaches with Red Circle Rolls

The Red Circle on Hyde Park Rolls is your assurance of perfect performance and long service—factors that make for increased tonnage and greater economy of production.

Look to Hyde Park for the best in Rolls, Rolling Mill Equipment and Gray Iron Castings.

RED CIRCLE Rolls ALLOY-CHILLED

Hyde Park

FOUNDRY and MACHINE CO.

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

Steelmaking

M. W. LIGHTNER
Vice President, Applied Research
U. S. Steel Corp., Pittsburgh

being made semicommercially.

We look for continued effort to produce more accurate strip with fewer edge-to-center and end-to-end variations.

Automation will continue. Card programming of reversing roughers in semi-continuous hot strip, slabbing, and structural mills, has shown improvements. You can expect computer techniques to modify rolling schedules automatically.

Aircraft and military people are exerting pressure for new, rare metals in strip form. Titanium, molybdenum, beryllium, and superalloys involve new and special problems of manufacture. Problems of dimension (wider, thinner, flatter, and more accurate strip down to one-fourth of the standard AISI tolerances) and the small tonnages involved will lead to special rolling techniques: Sandwich rolling and special rolling mills for both hot and cold rolling.

In the general commercial strip rolling field, there will be expansion and development in the finishing end. Strip pickling, including mechanical descaling, will exceed 600 fpm; continuous electrolytic cleaning and annealing of tin plate will approach 2000 fpm; high speed electrolytic tinning in coil form will also be up around 2000 fpm.

Oxygen, Basic Roofs, Vacuum Will Bring Major Benefits

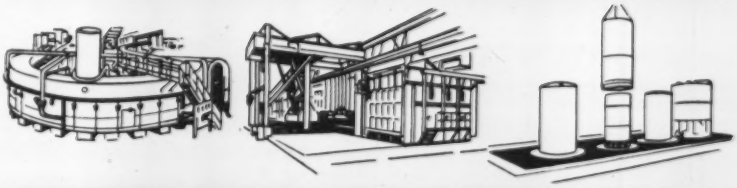
—M. W. LIGHTNER

• The most far reaching development is low cost, high purity oxygen. Oxygen plants will soon be a necessary part of all steel mills.

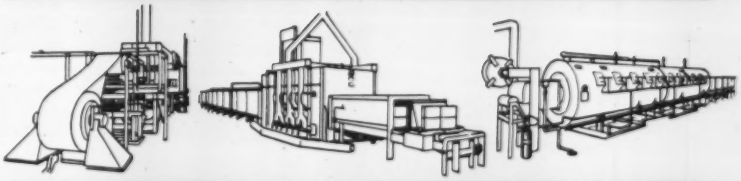
(*Please turn to Page* 208)

THE ELECTRIC FURNACE CO.
EF
GAS-FIRED OIL-FIRED AND ELECTRIC FURNACES
FOR ANY PRODUCT PROCESS OR PRODUCTION
SALEM, OHIO

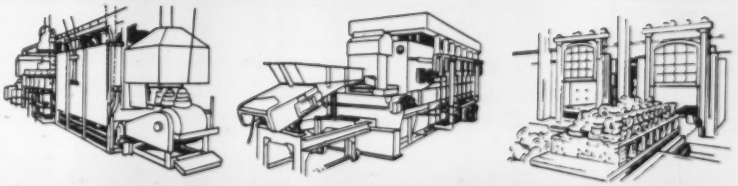
EF BUILDS ALL TYPES AND SIZES



GAS FIRED, OIL FIRED and ELECTRIC



EF Builds the Furnace to Fit the Job



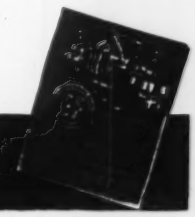
No Furnace is Too Large or Too Unusual

We have the engineers, the experience, the research and experimental departments and the complete manufacturing and erection facilities to build the size and type required for any heat treating process.

Submit your production furnace problems to experienced engineers—*it pays.*

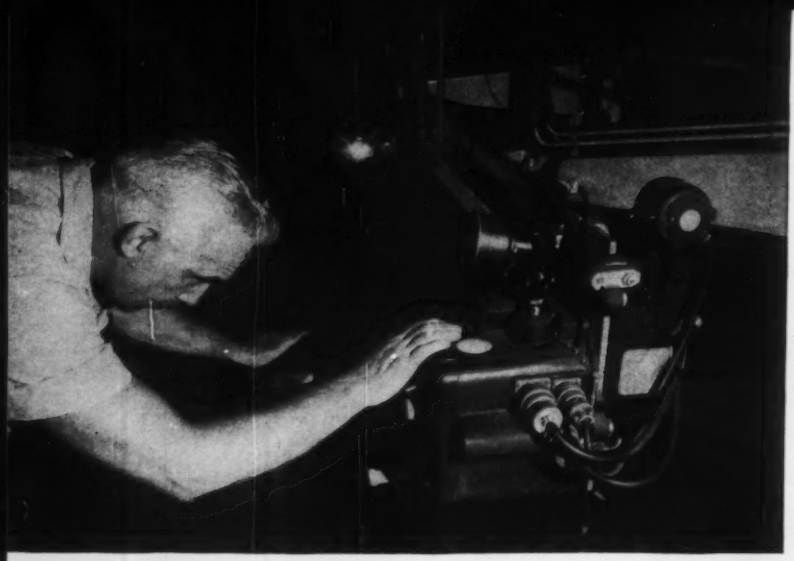
EF

BULLETIN No. 461
shows typical installations of EF Gas-fired, Oil-fired and Electric Furnaces.
Send for a copy today!

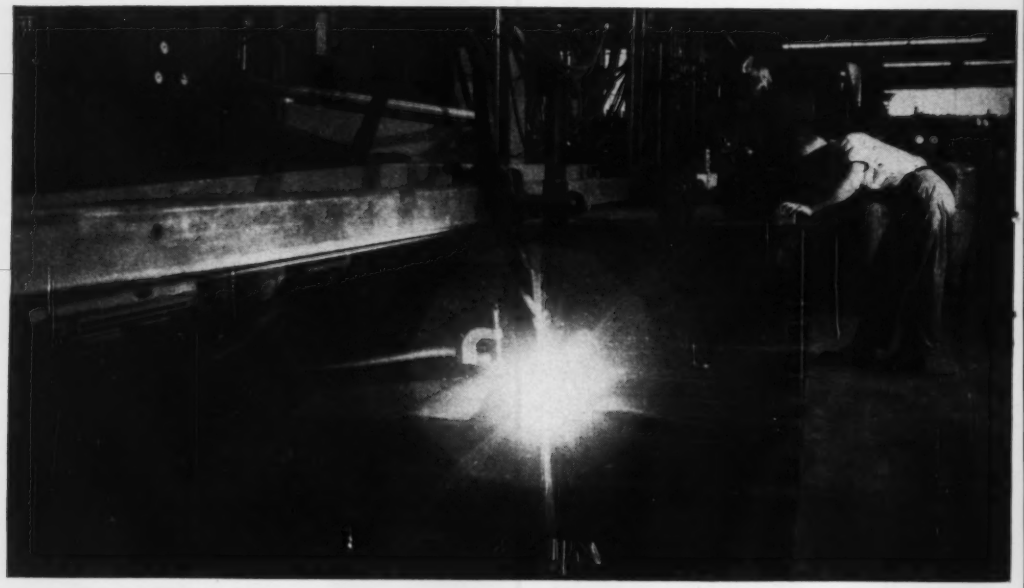


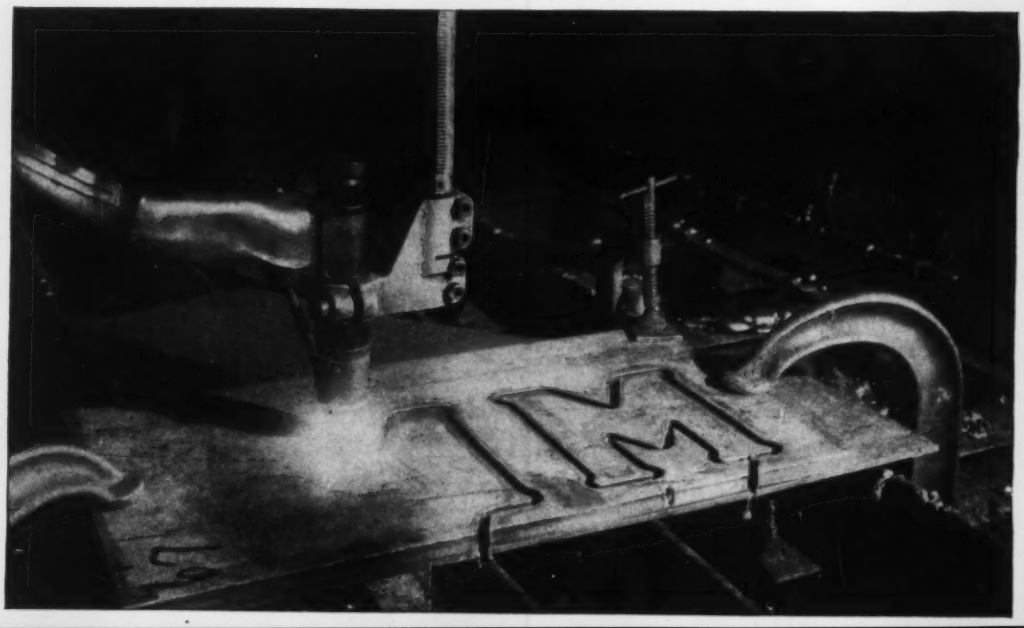
THE ELECTRIC FURNACE CO.
GAS-FIRED OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS PRODUCT OR PRODUCTION
Salem - Ohio

Canadian Associates • CANEFCO, LIMITED • Toronto 13, Canada



NOW IT'S TO CUT





EASIER THAN EVER HEAVY STAINLESS PLATES

New technique cuts irregular shapes from 2″ Stainless Steel plates without post-machining or annealing

TODAY, when a designer knows that a particular part should be made from Stainless Steel, he doesn't have to settle for a substitute material because of fabrication difficulties. Fabricators aren't stymied by Stainless Steel. They've learned that this miracle metal isn't difficult to fabricate—it's just different—and they've developed new equipment and methods to fabricate it.

A good example is the gas-shielded arc cutter used by **Morrison Steel Company,** New Brunswick, New Jersey, a leading Steel Service Center selling USS Stainless Steels. The gas mixture shields the Stainless and protects the kerf wall from oxidation. The combined heat of the arc and force of the gas stream make a smooth cut that seldom needs post-machining or annealing to attain a smooth edge and good microstructure.

By assuring close tolerances and eliminating contamination, this type of cutting opens new avenues to design engineers and cost-conscious production men. And most remarkable of all—virtually any irregular shape can be cut from Stainless Steel plates *up to 2″ thick.*

Developments such as this prove the adage that "service sells steel," a philosophy firmly held by Steel Service Centers selling USS Stainless Steel. To be assured of service-tested quality when you order Stainless from a Steel Service Center, specify USS Stainless Steel.

USS is a registered trademark

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

USS United States Steel

52100
LEADED BARS
PETERSON STEELS, INC.
Union, New Jersey • Detroit, Michigan • Chicago, Illinois

Steelmaking

JOHN P. HOLT
Executive Assistant to Vice President, Basic Inc., Cleveland

Much work remains to be done before we will know whether any direct reduction method will compete with the blast furnace. We must not overlook the increased productive potential of blast furnaces, with fully beneficiated burdens, self-fluxing sinter, high top pressure, and oxygen enrichment of the blast.

A practical and economical open hearth roof using basic brick stimulated construction.

About 75 basic roofs will soon be in use. They will permit higher firing rates and with oxygen roof lances will increase open hearth productivity.

Vacuum casting of steel, which originated among producers of heavy forgings, is finding favor among the specialty steel producers. Much experimentation and evaluation of vacuum process quality remains to be done.

Oxygen Trend Will Require Improved Basic Refractories

—JOHN P. HOLT

• By the end of 1959, oxygen converters may produce 5 million tons. By 1965, that could be tripled.

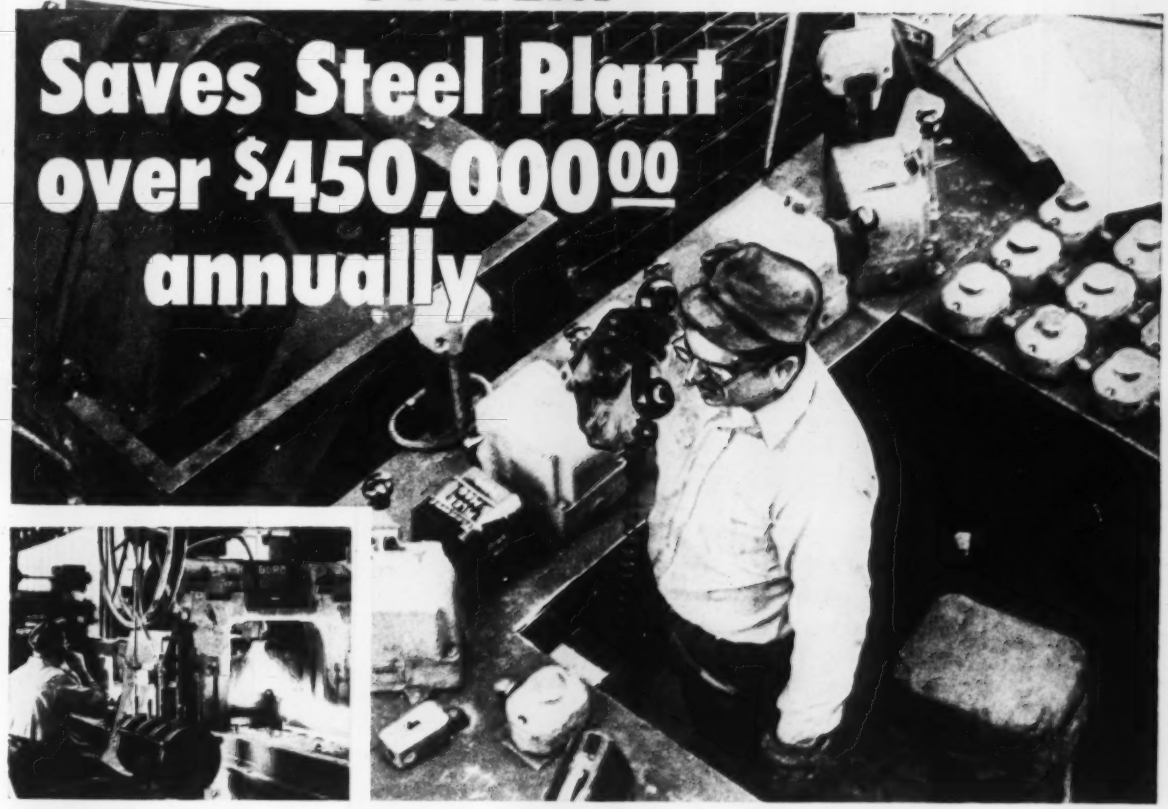
Open hearth shops won't be scrapped. They will be around for many years to come, but will face competitive pressure from oxygen steelmakers. He has already accepted that challenge: Witness the production of 40 tons of steel per hour. Some even turn out 65 tons per hour.

Oxygen has been a principal factor in those records. It plus increased firing rates and more automatic control will lead to productivity undreamed of ten years ago.

Greater open hearth production rates

NEILL *Engineered* COMMUNICATING SYSTEM*

Saves Steel Plant over $450,000.00 annually



NORTHWESTERN STEEL & WIRE CO. STERLING, ILLINOIS

ENGINEERED NEILL LOUD SPEAKER COMMUNICATING SYSTEMS are proving in installation after installation to be cost-cutting, efficiency-raising production tools. They pay for themselves in weeks in man hour reductions, elimination of mill returns and in accident prevention.

- The figure shown above is a conservative estimate. Actually, these savings will prove much greater over a period of time.
- It may pay you to talk with one of our engineers—without obligation of course.
- We'll be pleased to survey your operations to determine if similar savings can be effected for you.

**Not to be confused with ordinary paging systems.*

Phone or write us for an appointment.

Cuts costs in these ways . . .

- **Eliminates mill returns.**
- **Provides better quality control.**
- **Saves production down time.**
- **Cuts man hours.**
- **Provides superintendent with complete supervision of production line.**
- **Reduces set-up time.**
- **Increases out-put efficiency.**
- **Increases accident prevention.**

R. W. NEILL COMPANY, INC.

4330 West Montrose Avenue • Chicago 41, Illinois

telephone: SPring 7-6200

In Dust Collection Systems...

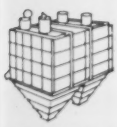
SF Precipitator at a steel plant.

design makes the difference

Higher efficiency of Buell 'SF' Electric Precipitators is the result of exclusive engineering features. For example, Buell's *Spiralectrodes* emit 50% to 100% more electrons than other types . . . and *maintain* their efficiency. Positive gas flow control through adjustable baffles prevents scouring and eddying. And Buell's Unique Continuous Cycle Rapping practically eliminates "puffing".

BUELL CYCLONES

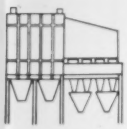
Lower installation cost of Buell's time-proved simplified design makes erection faster and easier. Spiralectrodes, for example, are self-tensioning, require no weights. Flexibility of power supply means easier installation, operating safety.



"SF" ELECTRIC PRECIPITATORS

Lower maintenance cost is the result of many details of superior design. And sectionalized design permits shutting down part of a unit without interrupting service in the rest of the unit.

Get full information: write for a copy of "Buell SF Electric Precipitators", a 22-page booklet. Write to Dept. **26-A**, Buell Engineering Co., Inc., 123 William Street, New York 38, N. Y.



PRECIPITATOR-CYCLONE COMBINATIONS

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

Steelmaking

G. E. DRAKE
Vice President, Electro Metallurgical Co.
A division of Union Carbide Corp.
New York

and increased oxygen input means a sharp stepup in the deterioration of refractories. Many operators are building all-basic furnaces, a trend that is likely to gain momentum.

Despite the superior resistance of basic refractories, certain areas such as skewbacks, front walls, and front piers will give out more rapidly than other parts. A promising repair method: Gunning granular basic refractories onto eroded spots.

At present, gun maintenance is practical under certain conditions. Improvements will come in the near future. Development of the technique is a must if we are to realize full measure of the potentials in the open hearth.

Two New Ferroalloys Will Aid Steelmakers

—G. E. DRAKE

• Rising steel production during the second half of 1958 could not do much to lift ferroalloy sales. Total alloy sales estimates for 1958 were about 80 per cent of 1957 sales. They should increase by about 25 per cent next year.

The 1958 price picture was relatively stable. The year ahead holds no promise for firm prices.

A bright spot in ferroalloys is stainless steel production, which recovered more rapidly than steel as a whole. We expect 1959 will top 1 million ingot tons.

A highlight of that picture is the record being set by 200 series stainless steels. That was partially responsible for providing a better position for chromium and manganese.

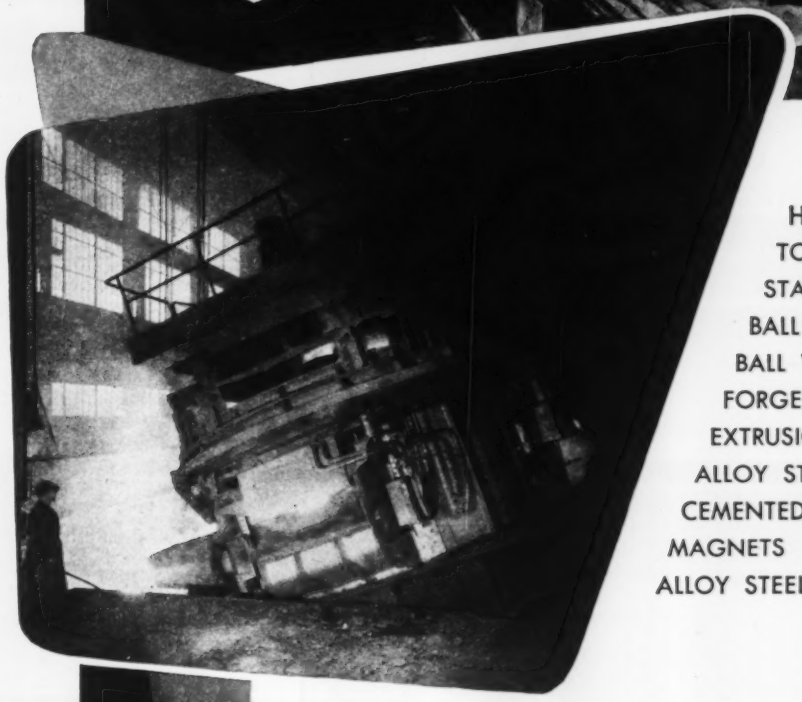
Two new ferroalloys were introduced

(*Please turn to Page* 212)

DEW

Our tradition for more than 150 years

Our Progress At Your Service



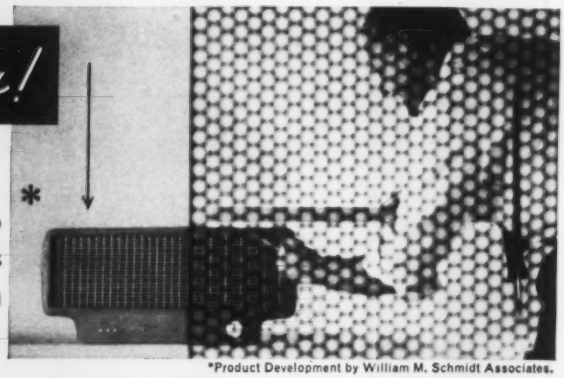
HIGH SPEED STEELS
TOOL STEELS
STAINLESS STEELS
BALL BEARING TUBES
BALL WIRE
FORGED ALLOY STEEL ROLLS
EXTRUSION PRESS PARTS
ALLOY STEEL CASTINGS
CEMENTED CARBIDES
MAGNETS
ALLOY STEEL FORGINGS

MARATHON SPECIALTY STEELS, INC.

375 Park Avenue, New York 22, N.Y. • Cable: Specsteels, New York

Idea!

mock-up projects design

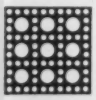


*Product Development by William M. Schmidt Associates.

with H & K perforated metals

A few of the thousands of H & K patterns are illustrated in reduced size

Send today to nearest H & K office for General Catalog



Here is an H & K perforated metal grille utilized in a mock-up of a record player. This greatly helps the Industrial Designer project his concepts as H & K perforated metal is now in its proper element for consideration of use and selection of pattern.

By referring to the H & K General Catalog, the designer can select one or more patterns for his project.

H & K perforated metals provide the Industrial Designer, and other men of ideas, a medium of unlimited opportunities for designing better and more attractive products.

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse
5627 Fillmore Street
Chicago 44 Illinois

New York Office and Warehouse
118 Liberty Street
New York, New York

Cuts Casting Handling Costs!

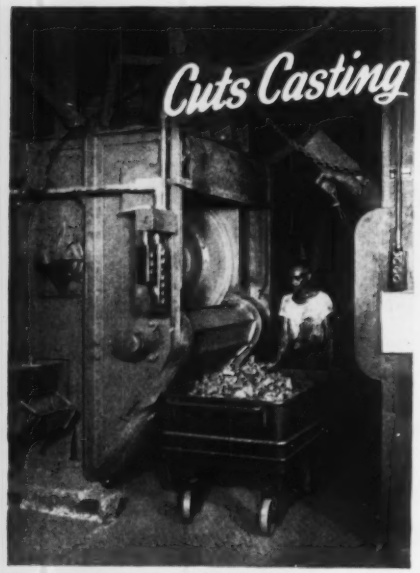


Illustration shows one of 25 Sterling Heavy Duty Trucks in daily use at the Green Foundry, St. Louis, Mo.

Sterling Heavy Duty All-Steel Trucks are ideal for transporting castings from Wheelabrator, Roto Blast or similar equipment. 2000 lbs. capacity. Reduces number of loads required. Saves both time and labor. Height is adjustable to accommodate discharge door. Roller bearing wheels and ball bearing swivel casters increase maneuverability. Sturdy, reinforced welded construction. Ask for Cat.

STERLING NATIONAL INDUSTRIES, Inc.

Founded 1904 as Sterling Wheelbarrow Co.

Milwaukee 14, Wisconsin, U.S.A.

Sterling FOUNDRY EQUIPMENT

A 5656-1/4R

Steelmaking

R. P. HEUER
Vice President, General Refractories Co., Philadelphia

which will aid economical steelmaking: Ferromanganese-silicon and refined charge chrome. This year, special alloy compositions, such as a new vacuum-processed, low carbon ferrochrome, will be introduced for more economical furnace or ladle additions.

The ferroalloy industry will introduce and market high purity, vacuum grade compositions for the growing vacuum melting industry.

The years ahead will see an expanding market for heat resistant alloys. One area of heavy research is the study of effect of rare metal additions to base metals. An example is columbium in low alloys steels to improve the grain and increase toughness. Such work will do much to increase the effectiveness of metals and alloys in severe environments. The ferroalloy industry will contribute much in that area.

All-Basic Open Hearths To Sweep Steelmaking

—R. P. HEUER

• Last year marked the final acceptance of the all-basic open hearth. All-basic open hearth roof construction in the U. S. increased from less than 2 per cent to almost 10 per cent this year.

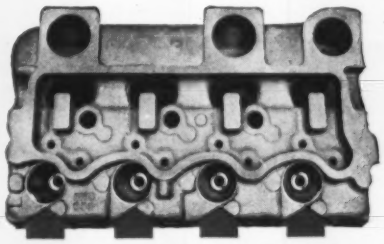
All signs point to accelerated growth during 1959.

Such speed in adopting a new refractory practice is unprecedented.

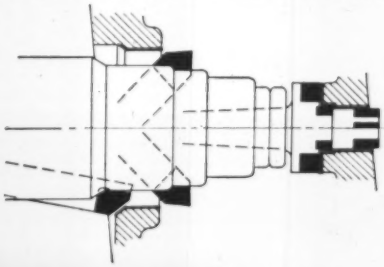
Reasons include increased firing rates and more oxygen for combustion and decarburization.

Wide use of such roofs presage other changes.

Completely basic ends now serve about



MACHINES 21 CYLINDER HEAD SURFACES IN ONE PASS WITH DEPTH OF CUT BETWEEN 1/8" AND 3/16"
Rough castings are bored, plunge-faced and chamfered at a rate of 18 parts per hour. Tooling is shown below.



NEW!

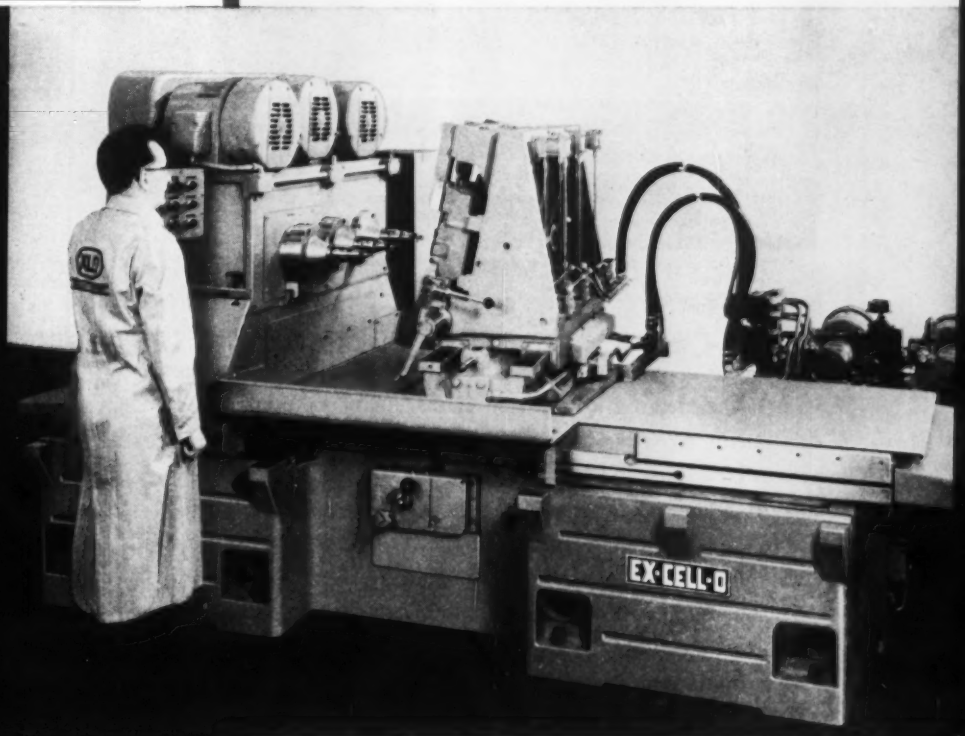
Heavy-Duty Precision Boring Machine

From base to bridge-top, Ex-Cell-O's new Style 771 Precision Boring Machine is engineered to keep pace with changing production needs and built to give years of precise profitable performance.

A specialist in fast, heavy-duty work such as the multiple machining operations detailed at left, the Style 771 (and the companion double-end Style 772) provides ample work space for complex tooling setups and bulky fixtures.

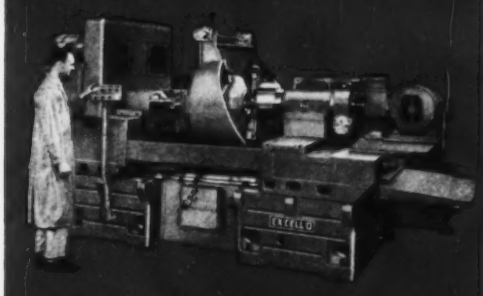
In-built versatility permits a broad range of rough, semi-finish and finish operations with automatic cycling. Rigid construction gives the "beef" needed for machining large, heavy parts, and supplies a wide margin of steadiness for high production of smaller precision parts.

Ex-Cell-O Precision Boring Machines can put greater precision into your products at lower per-unit cost. Get the full story from your local Representative, or write direct.



RIGHT: Style 771 machines both 4-and-6-cylinder tractor components. As cycle starts, table rapids to left, spindles rotate and feed traverse begins. At end of stroke, table rapids out to clear tooling; fixture indexes, cycle repeats for second set of holes.

BELOW: Double-end Style 772 performs multiple machining operations on tractor gear case cover.



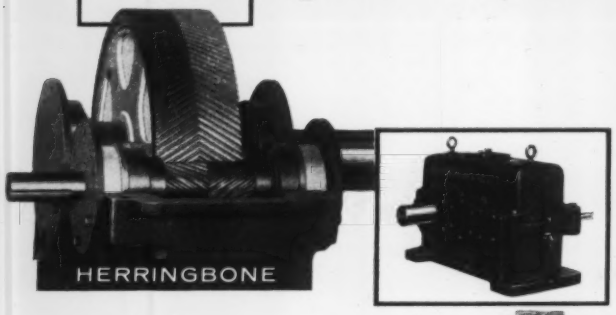
XLO EX-CELL-O FOR PRECISION

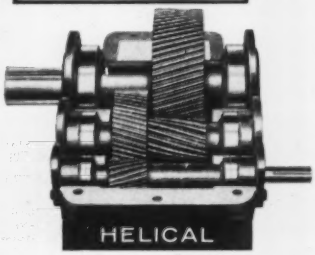
EX-CELL-O CORPORATION *Machinery Division*
DETROIT 32, MICHIGAN

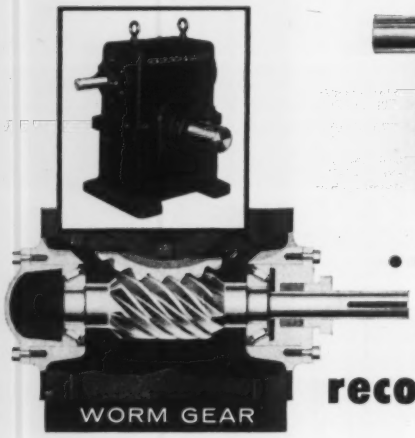
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

58-49

3 H&S Speed Reducers







. . . assure *unbiased* recommendation

Each of these three general groups of H & S Speed Reducers has its particular mechanical advantages which make it more efficient for specific duties. There are many considerations, such as speed of driving and driven shafts, shape of housing and drive characteristics that must be considered for lasting reducer performance and economy.

With the complete H & S line of Speed Reducers to choose from, you can be sure of our unbiased recommendation and your selection of the right type reducer for each specific job.

H & S Reducers are available in single reduction units in ratios up to 100 to 1; in combination units up to 700 to 1; and in double reduction units up to 10,000 to 1.

Make H & S your source for *all* speed reducing requirements.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue
Cleveland 14, Ohio

Steelmaking

H. R. BOATMAN
Asst. Superintendent, Service Dept.
Quality Control, Inland Steel Co.
Chicago

40 per cent of all our open hearths. Increasing conversion of furnace ends to all-basic is certain.

Furnace designs will be modified to take advantage of basic refractories. End structures will be changed to displace the massive venturi port construction. Driven fuel makes smaller ends possible. They can be built to withstand more severe operating conditions.

Smaller ends can increase present furnace capacity without a major capital investment. They require less refractory and improve combustion.

The conversion to all-basic calls for some changes in refractories production. Fortunately, manufacturers have foreseen such needs and have prepared themselves with new facilities and better sources of basic raw materials.

Predicts Wider Use, More Variety for Leaded Steels

—H. R. BOATMAN

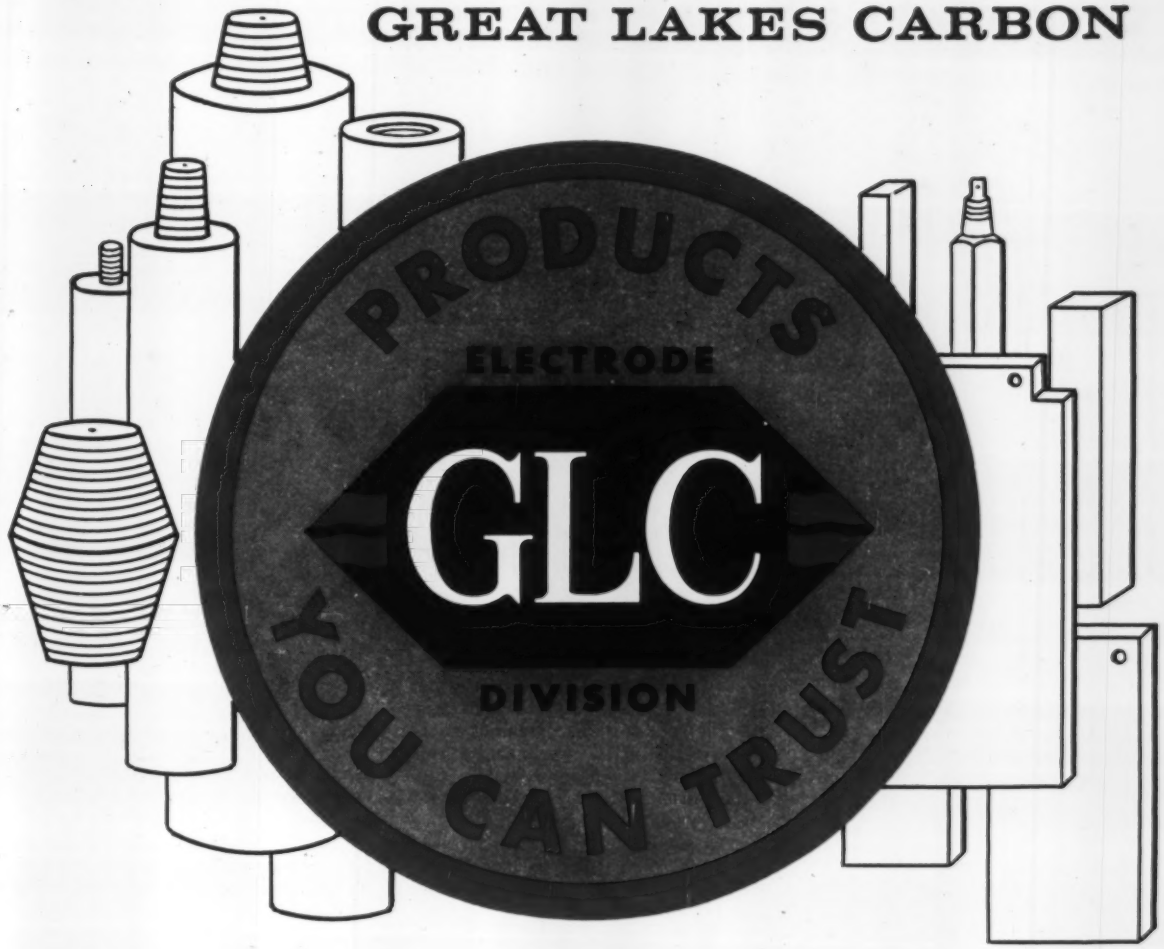
• Leaded steels that reduce costs without loss of quality continue to gain popularity.

Only bar size products were made available, raising the question: Can we extend acceptance to such products as thin sheets, plates, forgings, and tubing?

The American Society of Mechanical Engineers (Case 1253) approved the use of leaded steel plates (flame and firebox quality) and forged fittings for application on boilers and unfired pressure vessels. The action should help fabricators reduce costs.

Sprocket makers already are saving with leaded steel plates.

NOW YOU WILL KNOW THEY ARE FROM GREAT LAKES CARBON



This New Emblem is your assurance of carbon and graphite products—production engineered to the highest standards of quality.

The emblem is being introduced in all of our packaging — in electrode end protectors, nipple cartons, palletized anodes, palletized carbon brick, and drums of carbonaceous materials.

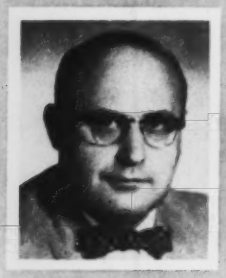
Watch for this emblem — it identifies products made to give you matchless performance.

ELECTRODE GLC DIVISION

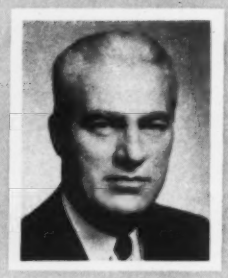
GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y. OFFICES IN PRINCIPAL CITIES

GRAPHITE ELECTRODES • ANODES • AND SPECIALTIES



JERRY SINGLETON
Executive Secretary
Magnesium Assn., New York



PIERCE M. WELPTON
President, Bridgeport Rolling
Mills Co., Bridgeport, Conn.

F. A. McGONIGLE
Vice President, Howe Sound Co.
New York

FORREST M. PALMER
Technical Director, Aluminium
Limited Sales Inc., New York

1959 FORUM ON TECHNICAL PROGRESS

Nonferrous Metal Production

Magnesium Sales To Edge Up As New Uses Are Pioneered

—JERRY SINGLETON

• Leading magnesium fabricators are optimistic.

As has been the case since defense requirements became uncertain two years ago, magnesium applications continue to reflect the search and research necessary for improvement of alloys and advancement in processing techniques.

The introduction of new alloys has opened wider the stairway to high temperature uses, to applications where high damping capacity is essential, and to possible cold forming techniques.

Chemical milling has been developed into a useful, practical technique, and new dip brazing methods have proved successful. Advances in mechanical fastening techniques have been announced and are undergoing service testing. A new colorless anodize finish for magnesium could be the critical factor in opening unlimited new areas of application, particularly in consumer goods.

As weight continues to be a critical factor on the road as well as in the air, the willingness to try magnesium despite an inherent reluctance to change becomes more and more apparent. Tooling plate applications continue to grow. Over-the-road equipment gives evidence that it will be an important market—increased fees based upon vehicle weight make greater payloads essential to profitable operation.

The automotive industry has shown extensive interest in magnesium. Its long and successful use by Volkswagen opens the possibility that the upcoming "small" American cars may utilize this light, strong, versatile, easily worked metal.

Continuous Casting To Bring Early Benefits to Brass Mills

—PIERCE M. WELPTON

• The major technical question facing the brass mill industry this year is whether it will be able to make progress fast enough to meet the demands of our country, the customer, and the consumer. I believe the answer lies in the continued awakening of all in the industry to the bold new ideas being offered by forward thinking technical people.

Foremost of the technical ideas available are those on continuous or automated production methods. The brass mill industry has become aware of the need for faster, more versatile, and more accurate equipment that will produce higher quality metals. We recognized this need in 1956 when we arranged to purchase the latest type of Hazelett continuous casting machine. We believe it will have a tremendous impact on the industry in the near future.

The industry is also beginning to expand the uses of brass and bronze and to develop new alloys to meet the demands of atomic and missile high temperature applications. In the next few years many new alloys will be developed to meet those needs. They will have a major impact on our industry because they will tend to fill the gap left when many brass customers turned to substitute materials to avoid the widely fluctuating copper prices.

Tungsten Points Research Guns On Alloys in the 1800° F Range

—F. A. McGONIGLE

• The demand for alloys that will operate satisfactorily at 1850° F and higher has accelerated metallurgical research aimed at utilizing the high melting point and recrystallization temperature characteristics of tungsten. Recent reports show promise that increased proportions of tungsten in certain cobalt base alloys demonstrate encouraging properties at 1800° F. New developments on tungsten base alloys indicate further testing may show them to be usable at 1850° F or more.

Tungsten oxidizes catastrophically above 1700° F, hence much of the research is aimed at overcoming this deficiency. A breakthrough on this one problem would mean a major stride toward keeping our

C. P. GOSS
Vice President, Scovill Mfg. Co., Waterbury, Conn.

FRANK H. VANDENBURGH
President, Mallory-Sharon Metals Corp., Niles, Ohio

J. C. DOUGLAS
Vice President-Technology Electro Metallurgical Co. Division of Union Carbide Corp. New York

ROBERT L. ZIEGFELD
Secretary-Treasurer, Lead Industries Assn., New York

metallurgical knowledge from lagging too far behind nuclear and spacial requirements. Reports indicate progress on a coating system has already been made.

Significant progress in the use of vacuum type melting furnaces to prepare alloys and high purity metals is being made and will continue. That technique is of great significance and should become more important as high temperature alloys are produced.

Alloy Research Leading to More Versatile Aluminum Products

—FORREST M. PALMER

• An accelerating development of the aluminum market in terms of tonnage and products is our expectation for 1959.

Our research and development activities will continue to be concentrated in the field of new alloys, producing techniques, and on new industrial uses of aluminum.

Continued emphasis on improving ingot forms for easier, cleaner, safer handling by customers has led to the development of a new interlocking ingot bundle.

Alloy research is leading to more versatile brightening alloys as well as to exploration of new ranges in the magnesium silicide alloy system and close control of presently available alloy variations for special purposes. The successful introduction of Alcan B51S in 1958 illustrates this activity and usage of this alloy should reach major proportions in new aluminum end products in 1959.

High precision, direct chill, cast ingot should significantly aid customers in cost control of material for cold extrusion by both impact and hydraulic methods.

Advances in Continuous Casting Will Improve Brass Mill Goods

—C. P. GOSS

• The coming year will bring considerable development in the continuous casting of copper and aluminum alloys. In the copper alloy field, the Junghans-Rossi process, the Eldred process, and the direct chill process are all used commercially to produce a wide range of alloys for subsequent working into sheets, rods, wire, and tubes. The direct chill process of casting has been the standard of the aluminum industry for some years, and accounts for nearly all of the rolling slabs and extrusion billets made in this country. Those processes give the producer better castings and assure the customer of sounder, better quality metal.

In addition to the continuous casting processes now used commercially, there has been quite a bit of development work done on newer experimental processes, among them the Hazelett, Tessmann, Hunter-Douglas, and Goss methods. All of those except the Goss method are horizontal processes and offer obvious advantages to a manufacturer.

The use of continuous casting will continue to grow rapidly and the newer processes, now being developed, will become commercial in the next few years.

New High Temperature Alloys, Lower Prices To Aid Titanium

—FRANK H. VANDENBURGH

• Two recent developments point up the growing position and acceptance of titanium:

1. Substantial reductions in titanium sponge, billet, and bar prices indicate that this young industry is moving its products within reach of its countless potential customers.

2. The industry recently announced a group of new alloys which will greatly expand the metal's usefulness in both the aircraft-missile and commercial fields. Elevated temperature limits have been boosted to 1100-1200° F for long time use and to 1500-1600° F for short periods—all important operating conditions for tomorrow's air vehicles.

Commercial users will also be able to take advantage of those new alloys.

Basic producers in the industry have spent, and will continue to spend, substantial sums to develop and improve products and processes.

Zirconium, another of the newer metals rushed to the forefront in recent years, has properties that make it ideally suited for a cladding and structural material in nuclear powerplants. Recent price reductions make it more attractive to commercial builders of atomic powerplants.

Research Opening New Markets For Columbium, Tantalum

—J. C. DOUGLAS

• Columbium and tantalum procedures face a rising demand.

Tantalum demand is swelling under two pressures: The expanding defense program with its accent on missiles and their complex electronic circuitry; and new production and fabricating techniques which are making tantalum sheets, plates, and bars available for the chemical processing industries.

Columbium will be further tested as the major constituent of new jet engine alloys and perhaps as a structural element in breeder reactors. In the next few years, its electronic capabilities are expected to be clarified.

Tantalum will be more prominent than ever in its electronic area as larger sheets and thinner, purer foil is made available. And tantalum will probably gain a secure footing in the chemical processing equipment field in the next few years.

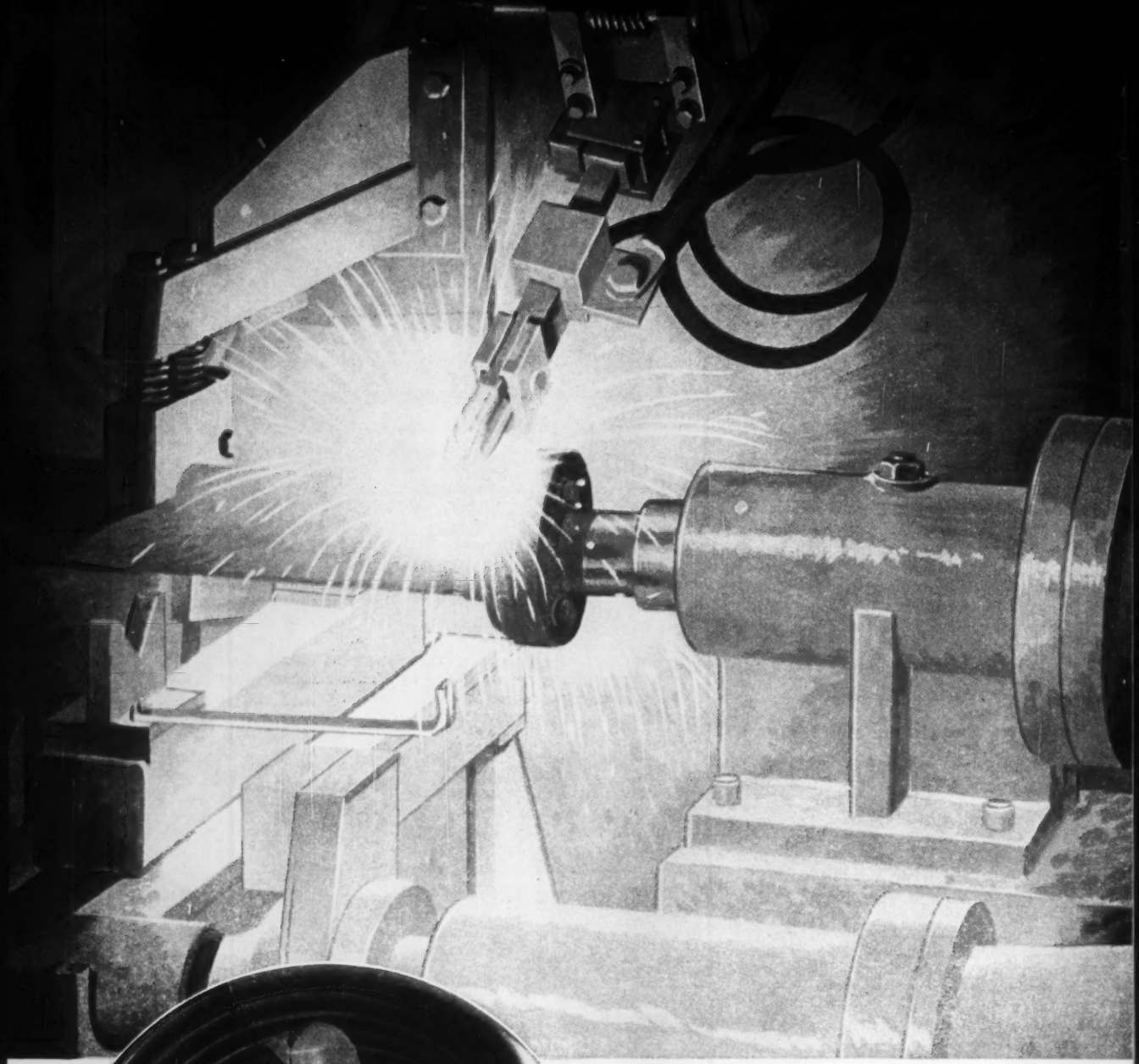
Products of Modern Technology Open Many New Doors to Lead

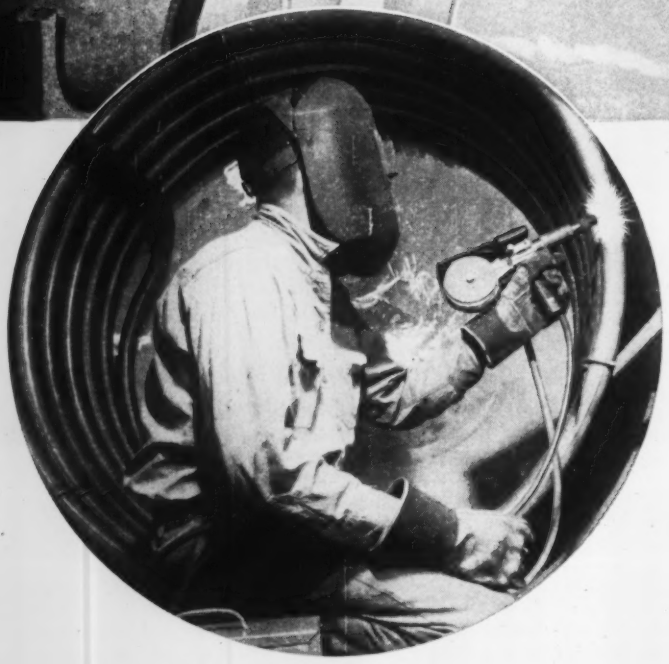
—ROBERT L. ZIEGFELD

• Developments of the last few years indicate excellent prospects for the wider use of lead and many new applications in the near future.

With a trend to a nuclear-powered

(*Please turn to Page* 220)





West-Ing-Arc® Dynamic Reactor greatly enlarges the fields of applications for welding and results in many "plus" benefits at a small investment to the user of any semiautomatic or fully automatic welding process equipment employing constant potential (voltage) power source.

If you presently use West-Ing-Arc equipment, or contemplate its use—the addition of the Dynamic Reactor results in cost-cutting extras . . . in addition to the efficiencies already inherent in the West-Ing-Arc process.

Order this versatile addition to your present equipment *now!* Or write for complete details on how this equipment can result in savings. Address: Dynamic Reactor, Welding Division, Westinghouse Electric Corporation, 4454 Genesee Street, Buffalo 5, New York. J-22140

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS," CBS TV MONDAYS

A "triple cost-cutting" **EXTRA** for welding stainless, mild steels and aluminum

The **NEW** WEST-ING-ARC®

DYNAMIC REACTOR

FOR USE WITH AUTOMATIC AND SEMIAUTOMATIC GAS SHIELDED, DC WELDING EQUIPMENT UTILIZING CONSTANT POTENTIAL POWER SOURCES

"ALL-POSITION" WELDING!
Overhead—vertical up—and down! Stability of arc at reduced setting.

REDUCED ELECTRODE WIRE COSTS!
Use at least one size larger diameter wire with no change in current setting, voltage or feed speed. Cost reductions from 1¢ to 17¢ per pound of deposited weld metal.

GREATER VERSATILITY!
Light-gauge metals now may be arc welded. No slag removal problems; practically no "spatter" . . . finished products are ready to paint or plate. CO_2 gas shielding for mild steel hand gun welding is practical!

STYLE 565D956G01

STYLE 427C503G01

2 LOW-COST, DUAL-RATED MODELS

- Style 427C503G01—150/300 amperes 100% duty cycle—Zone 1 price* **$159**
- Style 565D956G01—300/600 amperes 100% duty cycle—Zone 1 price* **$259**

*Slightly higher in Zones 2 and 3

ORDER NOW!

Watch Westinghouse for New Developments in Welding!

Nonferrous Metal Production

T. E. VELTFORT
Managing Director, Copper & Brass Research Assn.
New York

J. D. HANAWALT
Vice President, Dow Chemical Co.
Midland, Mich.

T. W. LIPPERT
Director of Marketing, Titanium Metals Corp. of America
New York

R. DAVISON
Manager-Market Development
New Jersey Zinc Co., New York

Navy and commercial ships, lead shielding is bound to grow in importance. A single ship may employ upward of 500 tons for shielding.

The many new industrial research laboratories, numbered in the thousands, using radiation sources mean more lead shielding in the laboratory and for shipping radioactive materials. A single cask for shipping spent fuel elements may involve 12 or more tons of lead.

Added to the familiar forms used up to now (such as sheets, castings, shot, bricks, and lead glass) are such newer forms as lead powder in combination with polyethylene and paraffin to provide dual shields and complicated forms.

In the field of electronics, all signs point to greater use of lead in many forms. Lead zirconate-titanate capsules are at the heart of stereophonic sound pickup elements and they may well be important in supersonic dishwashers, washing machines, and other devices of the future. Lead's properties as a superconductor and semiconductor are beginning to be recognized commercially.

Brass Mill Industry's Goal: Better Products and Services

—T. E. VELTFORT

• The brass mill industry continued to move ahead in 1958 with new facilities, products, and processes that will have a favorable impact on the metal-using industries in the months and years ahead. Whether the end product is for today's automobile or an advanced missile, a plumbing line or a solar heating system, the brass mills continue to seek ways to make it better.

The goal of this expansion and development is better customer service. Noteworthy are the two new brass mills on the West Coast. They will provide faster deliveries to users of wrought copper metal products in the western states.

Now available for heat exchanger tube buyers are longer length hairpin tubes with thickened centers which provide nominal wall thickness in bend areas. For added protection against inlet-end erosion, tubes with heavier gage ends are obtainable. New continuous annealing and cleaning machines—in conjunction with appropriate rolling equipment—produce coils of any length, fully cleaned and pickled, while making uniform temper possible at the same time.

Research is progressing on copper metals that will work more efficiently at high temperatures. On the packaging front, the brass mills have supplemented such innovations as pay-off coils with disposable reels to expedite customer operations. Another improvement is the new forging analysis service offered by a New England mill.

Magnesium Set To Assume Wider Role in Metalworking

—J. D. HANAWALT

• Magnesium's prospects in commercial markets have never been better. Its enhanced competitive position should become apparent in the next two or three years.

One of the chief factors is an improved diecasting technology. It results from the development of a technique for metered automatic feed of molten magnesium into cold-chamber machines. Indications are that the process is sufficiently economical to put magnesium in a position to compete in the automotive market.

Another factor is the availability of lower cost mill products, reflecting the development of new alloys and more efficient production methods. For example, a new sheet alloy used by the nation's largest luggage manufacturer is being evaluated in other commercial fields.

With increased commercial applications, economical finishes for both appearance and serviceability will become more important. The development of a clear anodize using a modification of the Dow 17 process is the first step in this direction.

New Titanium Alloys Ready For Aircraft, Missile Demands

—T. W. LIPPERT

• The titanium picture for 1959 will emerge from an amalgam of trends, hopes, hints, and a half-dozen military development programs now shifting into high gear.

The industry seems to have bottomed out, and although month-by-month shipment figures for 1959 may tend to be erratic, the year should show some over-all improvement over 1958.

Three factors must be remembered:

1. Defense activities will remain titanium's major market. Chemical and electronic applications will continue to improve, but those applications unfold rather than burst forth, and consequently take time.

2. Timing in moving current development projects into production will influence shipment patterns. If projects such as the B-70 and F-108 bog down, titanium production will show it.

3. Quantities of aircraft and missiles produced will exert a major influence on pounds of metal sold.

Zinc Diecasting Sales To Increase Sharply in 1959

—R. DAVISON

• With the increased output of passenger cars, appliances, and miscellaneous goods, 1959 will show a sharp increase in zinc use for diecastings.

During early 1958, an unusual amount of redesign activity was underway in durable goods to attract the consumer

recognized **opportunities**
for profitable fabrication

recognized hallmark
of **quality products**

brass • copper • aluminum

mill products
bearing this trademark

made better to bring out the ***BEST*** *in your products*

If you are planning a new product, let Scovill Technical Service help you select the proper alloy, temper, finish, etc., to bring out the BEST in it . . .

MADE IN U.S.A.
TO THE STANDARDS
OF AMERICAN INDUSTRY

SCOVILL MANUFACTURING COMPANY
MILL PRODUCTS DIVISION
99 MILL ST., WATERBURY 20, CONN.
PHONE PLAZA 4-1171

your production line

starts here

"We're guardians of the things you value most in the Mill Products you buy from Scovill . . . chemical and physical UNIFORMITY . . . uniformly good working qualities . . . inherently sound metal that never varies significantly from your specs . . . order after order, lot after lot.

"The methods and equipment used in Scovill Mills . . . ultra-modern processes like Continuous Casting of brass alloys and our "Truspec" Aluminum Sheet mill . . . make it possible to maintain exceptionally high metal standards.

"Still, day after day and hour after hour, we keep watch with detailed tests and inspections, using the finest mechanical and electronic testing equipment available."

Frederic M. Barry, Director, Metals Research Department

BRASS • COPPER • ALUMINUM

75C38

Scovill Manufacturing Company, Mill Products Division, 99 Mill St., Waterbury 20, Conn. Phone Plaza 4-1171.

dollar toward automobiles and appliances where existing models were making a disappointing sales record. That zinc die-castings have been used intelligently and in large volume on these 1959 models for beauty, efficiency, and economy is now evident.

Galvanizing was one of the brightest spots during the recession—1958 use was almost identical with 1957's. Even better consumption should be recorded in 1959 with culverts for the highway programs and air conditioning ducts for new and reconditioned buildings providing two of the largest markets for galvanized sheets, the most important segment of galvanizing.

Continuous galvanizing continues to open new markets: The smooth zinc coating on steel sheets results in superior paint surfaces which are much in demand to improve the appearance, and consequently the saleability, of cabinets of all types.

There are no new tonnage markets in brass, but this market should be greatly improved in 1959. Battery cans, the largest outlet for rolled zinc, are being helped by the growing popularity of electrically driven mechanical toys.

Predicts Tin Consumption in 1959 Will Top 55,000 Tons

—R. D. COURSEN

• Major consumers and government officials estimate that the domestic consumption of primary tin in 1959 will exceed 55,000 long tons and may equal the 1956 figure of 60,470 tons.

Significant researchwork is underway on the increased use of alloys in the aircraft, nuclear energy, and automotive fields. The use of tin-titanium-aluminum alloy, containing from 2.5 up to 20 per cent tin for jet planes has increased. Further research is underway to develop more advanced tin alloys which also include aluminum.

Of significance in 1959 may be the extended use of reticular tin-aluminum bearings for automobiles. In 1958, these bearings were used in the Italian Fiat automobile. Adoption in the U. S. automobile industry is now possible, as the result of further large scale tests underway by the large bearing manufacturers. Another automotive application of tin is in piston platings.

The perfection of a process for the electrodeposition of tin in a bright condition has opened up new applications in the electrical and electronics fields. Additional examples can be found in such articles as percolators and food machinery. Some of these tin platings are being utilized to take advantage of special properties, like corrosion resistance as in the manufacturing of surgical instruments.

The Tin Research Institute, supported by the major producers, is continuing to press scientific research to develop new uses; new, improved products; and improved processes.

New Brass Mill Equipment Will Spur Efficiency, Cut Costs

—DAVID T. MARVEL

• Brass mills will benefit from the recent sharp increase in industrial activity and inventory liquidation.

Sales should be boosted by the expected boom in residential construction and industry investment in new plants and equipment during the next few years and the increased use of brass in dwelling units.

Continuing competition from foreign brass mills and other metals makes it essential that the industry increase its operating and marketing efficiency at an unprecedented rate.

In this and succeeding years, research programs should have this as one of their main goals: The development of new production techniques and equipment for increasing efficiency and improving quality.

Versatility of equipment is the key to the resurgence of the brass mill industry because of the large variety of alloys it produces.

A major portion of the research effort should be concentrated on improving methods for the casting of rolling mill slabs to incorporate versatility into continuous and semicontinuous casting methods. Improved continuous and semicontinuous processes would make the production of long coils possible. They, in turn, would permit use of higher speed operating equipment, shrink the number of mill operations, and permit more efficient allocation of manpower.

To take full advantage of such developments, it will be necessary to overcome some of the problems inherent in annealing large coils of copper-base alloys. Equipment and processes for high speed strip annealing should be given a top priority in research programs. So should associated temperature control instruments; feeding, cleaning, and coiling equipment; atmosphere controls; and related equipment.

From the consumer's standpoint, the increased efficiency of the industry should act to bridle inflationary trends. Economies should be effected in fabricating by allowing more automation. Uniformity of brass mill products should result in a general improvement in quality.

Growth in Stainless Steel Uses Will Pace Nickel's Recovery

—CHARLES C. RIETH

• This should be a good year for the nickel industry. The brightest spot on the horizon is the future of stainless steel for commercial uses. Now that the stainless steel producers can intensify their sales programs, with the comforting feeling that there will be enough market price nickel available to back up these programs, this industry should certainly forge ahead.

The last year has been a difficult one for the nickel producing and nickel consuming industries, marked by overproduction, heavy inventories, and reduced consumption. It was a far cry from the

(*Please turn to Page 226*)

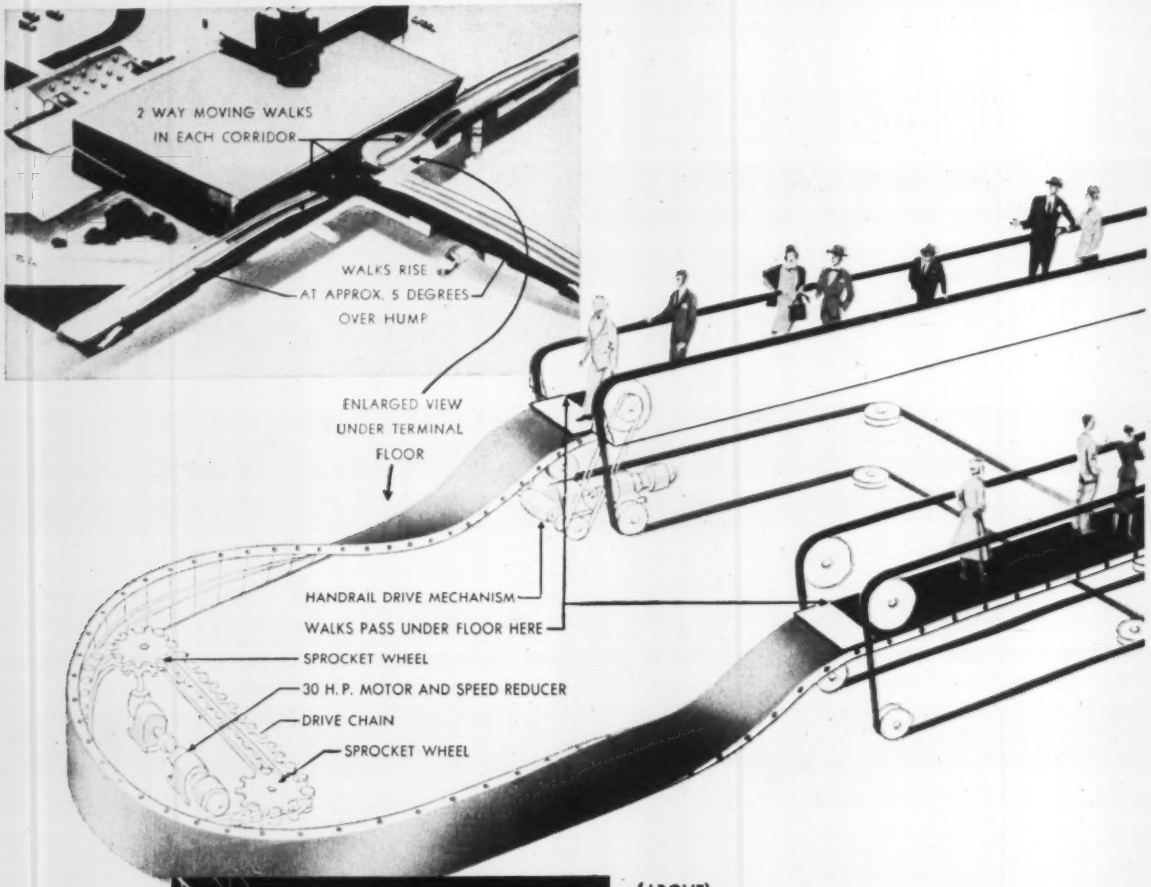
Nonferrous Metal Production

R. D. COURSEN
Director, Malayan Tin Bureau, Washington

DAVID T. MARVEL
Vice President-Brass Sales Metals Div., Olin Mathieson Chemical Corp., New York

CHARLES C. RIETH
Manager-Nickel Sales National Lead Co., New York

REVERE ALUMINUM



(ABOVE)
Schematic drawing showing the "Glide-Ride" moving sidewalk designed, manufactured and installed by HEWITT-ROBINS, INC., at the Love Field Air Terminal, Dallas, Texas.

(Opposite page)
Detail of balustrade with some of the various Revere Aluminum Extrusions used in the conveyors. The unseen track on which the handrail operates is extruded from Revere Bronze shape shown at bottom.

(LEFT)
"Much better than walking," say users of this moving sidewalk that has been a big hit ever since the day it was put into operation.

and BRONZE TEAM UP

to help make the world's longest

"Moving Sidewalk"

an attractive, dependable operation

Placed in operation at the Dallas Love Field Air Terminal, Texas, early in 1958, the world's longest passenger conveyor system has proved the answer to efficient transportation of pedestrians.

The three units which total more than a quarter of a mile in length extend out from the main terminal over three separate bridges to the first loading gate of each finger, carrying passengers in both directions.

These new Glide-Ride conveyors were designed, manufactured and installed by HEWITT-ROBINS, INC. Playing 2 important roles in these conveyors are 22,000 lbs. of Revere Aluminum Extruded Shapes and 22,000 lbs. of Revere Extruded Bronze. The aluminum extrusions were used as floor cove molding, handrail molding, spoon molding between balustrades and rubber carpet, and as a wall cove between handrail and wall. Not only are these Revere Aluminum extrusions attractive and decorative but their satiny finish will remain so for years with an occasional soap and water cleaning the only maintenance required.

Hidden under the moving rail is the track extruded from Revere Bronze, taking constant daily rugged wear in its stride.

The selection of Revere Aluminum and Bronze Extrusions was not a mere matter of specification. It was the result of HEWITT-ROBINS Engineers and Designers consulting with Revere's Technical Advisory Service men in order to determine the alloys and the shapes best suited to do the job required.

And so it is with practically every industry you can name. When you take your supplier into your confidence, discuss your problems with him, you invariably are rewarded with a better product at less cost, because the material finally selected is the *exact* material for the best job.

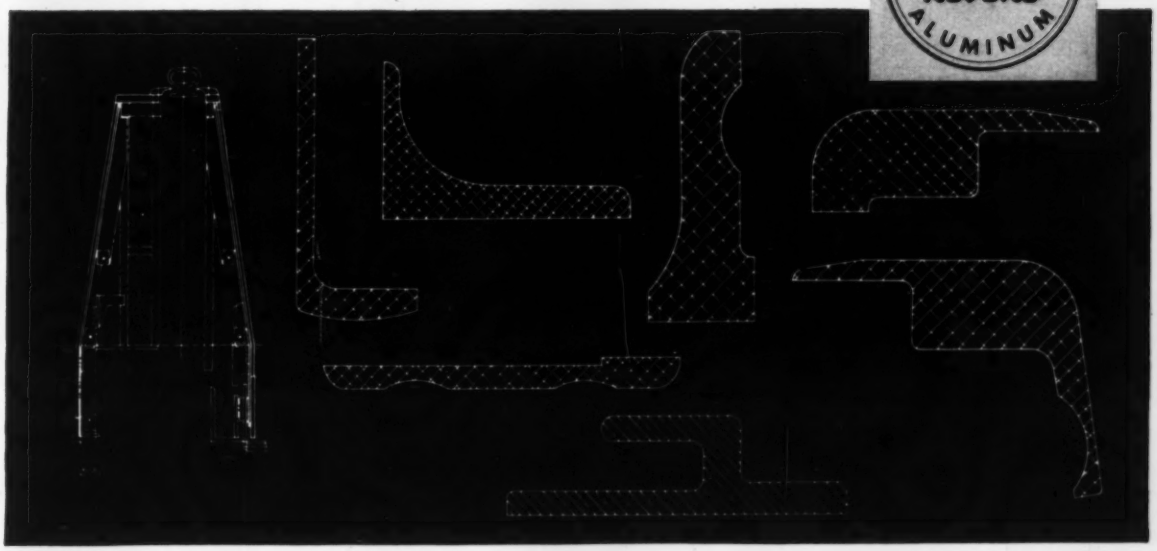
REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER * BRASS 1801 * REVERE * ALUMINUM



Nonferrous Metal Production

D. A. RHOADES
Vice President & General Manager
Kaiser Aluminum & Chemical Corp.
Oakland, Calif.

SIMON D. STRAUSS
Vice President-Sales
American Smelting & Refining Co.
New York

JOHN D. HARPER
General Manager, Smelting Div.
Aluminum Co. of America
Pittsburgh

prolonged period of shortage that prevailed previously.

During the shortage period, subsitutions were attempted, and in many cases accomplished. It will probably take some time to either regain these markets or develop new outlets.

A disturbing factor during the last year has been the ready availability of low price nickel scrap, and also distress lots of primary materials. However, it is reported that these have just about been dissipated, and scrap prices are now more in line with the cost of primary materials.

It appears that the consumption of nickel for military and defense use will not be as great as it has been.

The difficulties recently encountered in Cuba and Canada have interfered with normal production. If these are of sufficient duration, and business continues to improve, the overhanging inventories can well be materially reduced within a reasonable length of time. Barring international complications, it does not appear that there will be any serious or long-lasting nickel shortage for the foreseeable future.

The new space age will require a wide variety of new alloys. The flexibility and availability of the raw materials for these programs will be of vital importance. I confidently believe that the various nickel producers will meet these challenges, from a technological standpoint, and perpetuate the strategic importance of nickel.

A competitive market is in prospect and a real selling job will have to be done. This will be a healthy situation for all parties concerned.

Aluminum Breakthrough Seen As Major New Uses Open Up

—D. A. RHOADES

• We view 1959 as a year of rapid progress for new aluminum applications in many of the nation's most important industries. Major applications for aluminum which have been in development over long periods of time are now fully engineered, tested, and ready for adoption.

In aluminum, we are due for continuing breakthroughs on many fronts, both in 1959 and the years immediately following. Those breakthroughs will occur in some of our great industries—automotive, residential building, transport, food packaging, and the consumer durable goods industry, to name only a few.

The automotive industry will increase its aluminum usage by nearly 50 per cent in 1959 by conversions to aluminum in many automotive components, both functional and decorative. That estimate does not include several major conversions to aluminum such as engine blocks, integral wheels and brake drums, radiators, and bumpers. All of these, we believe, will be adopted within the next few years.

Developments in food distribution and merchandising, including aluminum cans, semirigid aluminum food containers and aluminum foil packaging, are already consuming many millions of pounds. Electrical conductor applications—transmission and distribution lines, building wire, and many varieties of insulated cable—also offer a rapidly growing market. The electrical industry as a whole is now using nearly 500 million lb of aluminum annually.

Lead and Zinc Production and Sales To Rise, Imports To Fall

—SIMON D. STRAUSS

• Assuming maintenance of at least year-end prices, production of lead at domestic mines during 1959 may average 26,000 tons a month, against 24,000 in 1958 and 28,000 in 1957. Domestic mine production of zinc is likely to be about 38,000 tons a month this year, against 35,000 in 1958 and 43,000 in 1957.

Imports during 1959 will be substantially less than they were in 1958 if the quota system is maintained. However, the limiting effect of quotas may be somewhat offset by U. S. government purchases of imported metal under barter transactions, which are not subject to quota limitations.

Deliveries of lead and zinc to fabricators will doubtless be considerably greater than they were last year. Even though imports are limited by quotas, there will be no difficulty (barring serious labor troubles) in supplying industrial demand because substantial stocks are still held by domestic producers. However, in the event of a prolonged strike the government would probably relax quotas. Most labor contracts in the domestic nonferrous metal industry expire in June, 1959.

Aluminum Supply Is Adequate To Meet Foreseeable Demand

—JOHN D. HARPER

• Today our customers need have no fear that the supply of aluminum will be limited. Basic producers are confident they can provide sufficient metal to meet the demands of all the burgeoning markets.

With the start of operations by two new basic producers, and the completion of new facilities by four others, the domestic primary aluminum capacity figure has increased 15 per cent since 1957.

Despite the decreased demand for aluminum in 1958, plans for the addition of new capacity have suffered no outright cancellations—the construction of such projects has been stretched out where possible. Completion of these projects (some at various stages of construction and some close to completion) will ultimately increase the domestic capacity to 2.6 million tons, up nearly 23 per cent from the current level.

The total U. S. aluminum supply picture includes imported tonnages, principally from Canada. The secondary aluminum suppliers remelt old and new scrap to provide sound metal for many consuming industries. When final figures are in for 1958, total metal supply from all sources is expected to be about 8 or 9 per cent below 1957 levels.

One of Alcoa's recently announced projects is the so-called Brokopondo Development, on the Surinam River in the

TIME PROVED SOURCE FOR
STEEL PLANT EQUIPMENT
78th
year
For over three-quarters of a century PECor has been a leader in the production of quality steel plant equipment. Many of the improvements in furnaces, converters, mixers and materials handling equipment of all kinds commonly found in steel plants today were pioneered by PECor. This background, coupled with our present modern facilities and a skilled engineering staff, makes PECor especially qualified to work with you on all your requirements.
Our 40-page catalog—available on request—will help you visualize how we can serve you best.
PENNSYLVANIA
ENGINEERING
CORPORATION
NEW CASTLE, PA.
Designers and Builders of
Blast Furnaces • Oxygen Furnaces • Converters • Tanks • Hot Metal Mixers • Ladles • Mixer Cars • Scrap Cars • Slag Cars • Ore Transfer Cars • Jack Cars • Ladle Transfer Cars • Ingot Cars • Thermo Metal (Bottle) Cars
REBUILDING—a specialty!
PECOR
STEEL PLATE FABRICATORS ASSOCIATION

Nonferrous Metal Production

J. L. KIMBERLEY
Executive Vice President
American Zinc Institute
New York

CHARLES H. WINSHIP JR.
Vice President, Phelps Dodge
Corp., New York

K. C. LI
Chief Engineer, Wah Chang Corp.
New York

interior of Surinam (formerly Dutch Guiana) and the site of Alcoa's principal source of bauxite. It provides for the start of construction by 1960 of a dam, powerhouse, and transmission line to supply 150,000 kw.

In addition, Alcoa will build a 60,000 ton aluminum smelter near the bauxite mining center of Paranam. The over-all project, which includes the eventual construction of a bauxite refining plant utilizing local ore deposits, will involve total expenditures of about $150 million.

In the U. S., Alcoa now owns outright or has under option sufficient coal reserves in the Midwest to operate four large smelters for more than 60 years. One of the smelters, near Evansville, Ind., is under construction. Known as Warrick works, it and three additional plant sites are all on navigable streams.

Diecasting Advances, Growth in Galvanized Sheets To Aid Zinc

—J. L. KIMBERLEY

• Excellent justification can be found for immediate as well as long range optimism for the zinc industry and its principal outlets, diecasting and galvanizing.

In galvanizing, awareness of the need for preventive maintenance is growing. Galvanizing of steel to be used directly or painted is increasingly recognized as sound economy.

Within that field, the largest single growth factor is shown in American Iron & Steel Institute statistics: Galvanized steel sheets rose from 2.5 per cent of total steel shipments in 1948 to over 5 per cent in some recent months.

The Federal Highway Program, which should be well underway during 1959, will serve as an additional and substantial outlet for galvanized steel of all sorts —for guard rails, culverts, bridges, tunnels, sign posts, and lighting systems.

A further increase in the usage of zinc diecastings is strongly indicated by a perpetual market survey conducted by the American Zinc Institute with manufacturing consumers. The increased use of aluminum by the automotive industry is not significantly or permanently "at the expense of" zinc diecastings, but rather, "in addition to."

Zinc usage by the brass industry (in the form of rolled zinc, in the field of zinc anodes for cathodic protection, and as an oxide for rubber and paint) continues to hold its own. In fact, these uses are expanding with the economy and through the improvements being achieved by the technical programs of the various producers as well as by the industry-wide programs of the AZI.

Copper Demand To Rise in 1959; Availability Will Be Adequate

—CHARLES H. WINSHIP JR.

• Copper consumption in the U. S. should improve moderately in 1959 because of a more favorable outlook for new home construction, more home remodeling, expansion of electric power and communications facilities, and better demand for automobiles and appliances. A period of adequate but not excessive supply, good consumption, and reasonable price levels is in prospect.

Mine production at established properties has been increased in the U. S. and in the Belgian Congo and some new properties are ready for production.

The current price level will make available to consumers copper that for some time had been shipped to the U. S. government under floor price contracts. The British Ministry of Supply has made available to consumers in the United Kingdom 10,000 tons from its stockpile.

Consumption outside the U. S. during the last several months has been at record levels and a decided pickup in consumption in the U. S. occurred in October. Consumption abroad may not continue as high as the October, 1958, level, but no appreciable drop in the 1958 average rate appears in the offing.

Statistically, the industry's stocks of refined copper in the Free World have been reduced to a level which is not considered excessive in contrast to the situation as late as April, 1958. Some part of the current increased shipments to fabricators can be considered a buildup of inventories. In turn, some shipments of fabricated copper and copper bearing products to customers of fabricators are undoubtedly for inventory accumulation. It's more than likely, however, that inventories, particularly beyond the fabricator level, had been reduced to abnormally low levels during the two previous years of oversupply and falling prices.

Missile Research Points to Tungsten as Ultimate Material

—K. C. LI

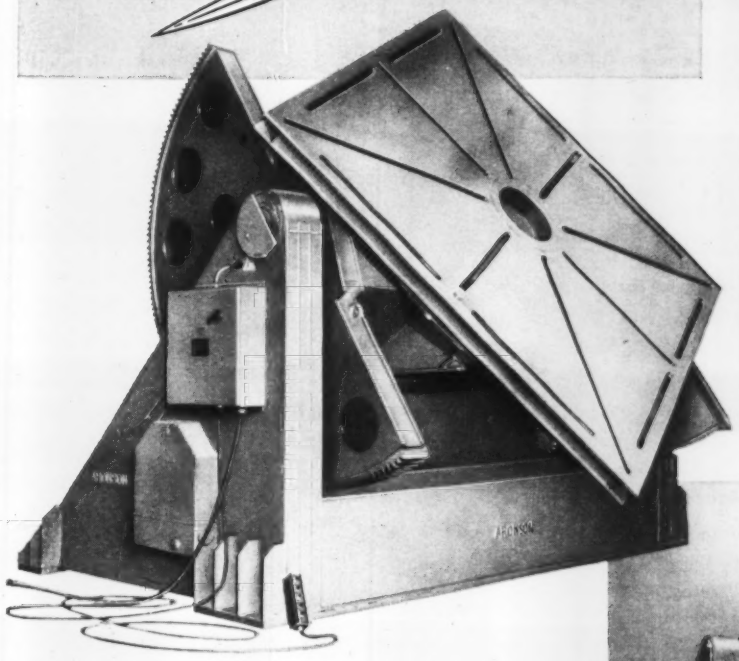
• Accelerated searches are underway for construction materials that will allow missiles to operate with more power and velocity to reach higher altitudes. While many materials are under consideration and testing, the search usually points to tungsten as the ultimate material. Besides being the metal with the highest melting and boiling points, tungsten also has the greatest strength at high temperatures. And in spite of its high density, the strength to weight ratio of tungsten is best of all materials at high temperatures.

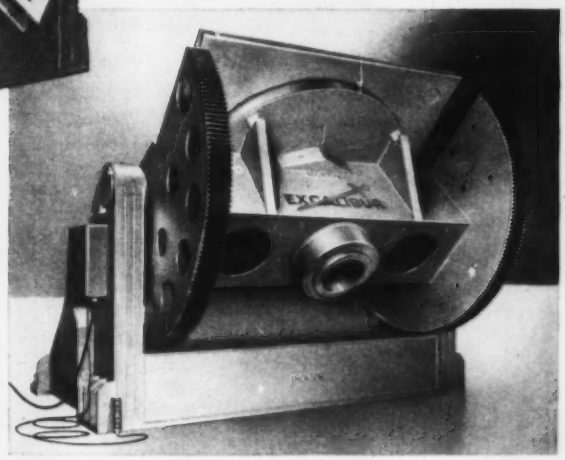
Yet, tungsten was comparatively neglected in the past by research and development workers. During the last year, however, intense efforts were begun to investigate the properties of tungsten for high temperature use and to develop fabricable tungsten. First, it is necessary to study in detail properties of tungsten, particularly at high temperatures. For this, highest purity material is being prepared. Data collected thus far show that tungsten has comparatively much higher tensile strength, yield strength, and modulus of rigidity than all other materials up to its melting point.

The body centered, cubic lattice structure of tungsten indicates that it should be ductile. As yet there has not been pure enough tungsten produced to be free of the influence of interstitial im-

EXCALIBUR.....

Welding Positioner 175 TONS CAPACITY





"EXCALIBUR" is rated 350,000 pounds Load Capacity with CG 12" above table and 6" off-center.

FOUR SELECTIVE VARIABLE SPEED RANGES obtained from the 4-speed gearshift transmission driven by 15 hp Varidrive afford far greater choice of variable rotation speeds. In High Gear top speed is .4 rpm adjustable to .07 rpm. This exceptionally high rotation speed permits automatic welding at high travel rate on diameters as small as eight inches! Then, for larger diameters shift into 3rd Gear and use the .23 rpm to .04 rpm range. Or, still larger work may require 2nd Gear's .13 rpm to .023 rpm range. Largest weldments are profitably rotated in Low Gear range's .08 rpm to .013 rpm.

"EXCALIBUR" is not physically tremendous, being only 88" from floor to horizontal rotation axis, which allows working both large and small weldments without needing excessive headroom and without working too high above the floor.

"EXCALIBUR" has been designed to handle almost every kind of weldment at lowest possible shop cost.

Owning "EXCALIBUR" opens production doors to you that are closed to your competitors. It is NOT a special job machine, but a Welding Positioner that will handle 90% of your jobs that are as small as a ton or so to as large as 175 tons!

Owning **"EXCALIBUR"** lets you weld automatically those jobs you now wrestle around the shop floor with the profit-eating crane and have to weld manually.

With **"EXCALIBUR"** in your list of machine tool facilities you not only can underbid competition but can assure the award of the contract because your customer will know you have the facility to handle his work.

Quality POSITIONERS by **Aronson MACHINE COMPANY**

ARCADE, NEW YORK

WELDING POSITIONERS • TANK TURNING ROLLS • TURNTABLES

35% NICKEL

DURALOY

15% CHROMIUM

Furnace Castings

Here are two good examples of our work in high-nickel castings!

Heat Treating

These are in the Duraloy HT group calling for Ni 33.37 percent. We've gone as high as 68% nickel on some castings where extremely high temperatures and very severe corrosive conditions had to be resisted. The important factor concerning castings for exceptionally high temperatures is that they must retain their structural form under load.

Carburizing

Knowing just how much nickel to put in and how much chromium and other alloying elements depends to a large extent on experience . . . and it is experience that we can offer you for the castings you need. We've been producing static castings since 1922 and centrifugal castings since 1933, being among the pioneer founders in each class.

If you would care to have our metallurgist study your casting problem, we shall be glad to have you call upon us for the service.

Our New General Catalog is yours for the asking.

HIGH ALLOY CASTINGS

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
ATLANTA OFFICE: 76—4th Street, N.W.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

Nonferrous Metal Production

DEREK RICHARDSON
Vice President-Aluminum Sales
Metals Div., Olin Mathieson
Chemical Corp., New York

purities. Much work is underway toward preparing the purest possible tungsten and measuring its properties.

Research Key to Winning New Markets for Aluminum's Growth

—DEREK RICHARDSON

• The need to achieve a more realistic balance between the supply and demand for aluminum has caused intensified research programs on new methods, materials, and processes aimed at the development of large tonnage applications.

Paramount will be the development of new alloys with higher strength, better finishing and corrosion-resistant properties, and improved joining adaptability. They will allow the industry to widen existing markets and expand into new ones.

Development of improved joining and welding methods and techniques will be a major research goal. Expect an improvement in the quality of filler wire used in welding aluminum. Porosity-free weldments will expand such applications as pressure vessels, missile components, and armor plate.

Adhesive bonding and pressure welding will be used extensively to join aluminum to itself and to other materials. For example: Composite panels of aluminum sheet with any one of a number of newly developed core materials will combine lightness with high strength for numerous applications in residential and commercial building construction.

One technological problem that should receive tremendous attention shortly is the improvement of the solderability of aluminum to achieve greater penetration in the electrical industry.

Improvement in the methods of applying protective film coatings at higher speeds and lower costs is another important technological problem facing the

For cost-wise TRANSMISSION design and maintenance ECONOMY

STANDARDIZE **on BOSTON Gear**

Catalog lists 7124 Standardized Products

STOCK GEARS • SPROCKETS and CHAIN • SPEED REDUCERS
BEARINGS • PILLOW BLOCKS • COUPLINGS • PULLEYS

You simplify planning. Select all the parts you need from one source – the Boston Gear Catalog.

You save time and expense. Order from your Boston Gear Distributor for off-the-shelf delivery. Why wait (and pay more) for parts "made-to-order?"

You get top-rated performance. Compare the quality and service life. You'll agree Boston Gear products set the highest standards.

Your Boston Gear Distributor is fully qualified to help you get the maximum benefits from standardization – in lower costs, in simplified servicing. Boston Gear Works, 73 Hayward St., Quincy 71, Mass.

Visit Booth No. 1913
PLANT MAINTENANCE & ENGINEERING SHOW

CALL YOUR BOSTON Gear DISTRIBUTOR

For nearest Distributor LOOK UNDER "GEARS" in the 'Yellow Pages'

INDUSTRIAL DISTRIBUTORS — THE RIGHT HAND OF PRODUCTION

Remember — STANDARDIZATION PAYS —®

NEW

For SHAFT MOUNTING or BASE MOUNTED to meet any drive condition

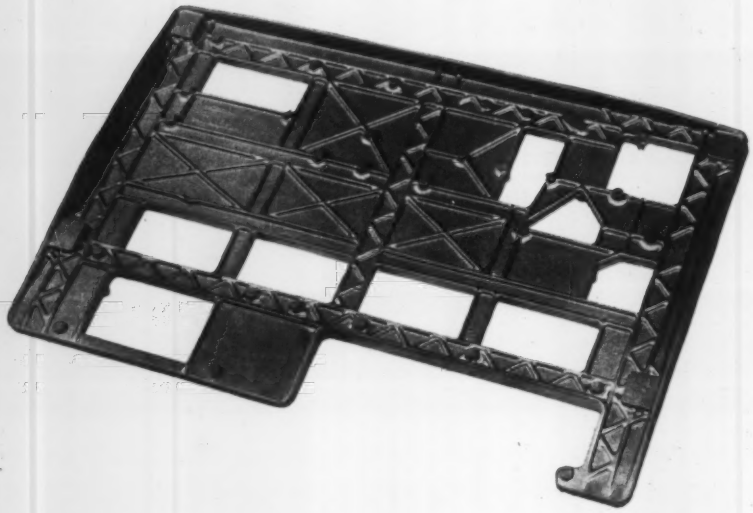
BOSTON Gear OPTIMOUNT TRADEMARK

HELICAL GEARED REDUCTORS RATIOMOTORS AND FLANGED REDUCTORS

Call your Distributor for complete information. Ask for Catalog OP-11

SINGLE or DOUBLE REDUCTION
¼ to 15 HP drives **66 models**

FROM STOCK!



DUCTILITY

A CASE IN POINT—This ninety-six pound casting was made for the National Cash Register Co. of Nodulite®, Hamilton Foundry's ductile iron. The casting forms the base for the new Post-Tronic Accounting Machine. It measures 37½" by 23½" with sections varying from ¼" to 1½". Ductile iron was chosen for this part because of its ductility, dimensional stability, rigidity, and machinability.

Ductile iron has most of the engineering advantages of steel yet it can be designed with the same flexibility and cast with the same procedures used for gray iron. It has high strength: up to 120,000 psi minimum tensile strength in standard grades. It is tough: Charpy impact strengths up to 115 ft.-lbs. in standard grades. It is ductile: elongation is possible up to 25% after short time annealing. And it is wear resistant: spheroidal graphite particles provide for self-lubrication. Hamilton Foundry regularly casts 60-45-10, 80-60-03, 100-70-03, and 120-90-02 grades of ductile iron as well as high alloy Ductile Ni-Resist.

When new and unusual design problems arise in the selection of metal and the casting of parts, you will find that the skill and integrity of your foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY

The Hamilton Foundry & Machine Co., 1551 Lincoln Ave., Hamilton, Ohio • TW 5-7491

Nonferrous Metal Production

HEINZ V. MENKING
General Director-Product Development, Reynolds Metals Co.
Richmond, Va.

industry. That would greatly expand usage in areas where corrosion is a problem.

A great need exists for the development of aluminum castings (particularly die-castings) with improved surface quality so that they can be finished by methods now used on competitive materials.

New Aluminum Uses Should Hike Sales to 4 Million Tons by '65

—HEINZ V. MENKING

• Despite a decade of fantastic growth, the aluminum industry is expected to continue expanding at a phenomenal rate. Consumption should approach 4 million tons by 1965, a growth of about 100 per cent in ten years.

Part of the metal will be absorbed by expansion of present markets. But the largest share of new consumption will be in markets recently developed by advances in technology.

Interlocking extrusions may be expected to appear in many new applications. Castings will demonstrate expanding usefulness. Development of wear resistant alloys containing silicon offers weight and cost savings for automobile brakes, industrial clutch plates and other friction applications. Vacuum diecasting of alloys will provide nonporous cast structures and smooth surfaces than can be economically brightened and anodized and that will permit thinner wall sections for pressuretight applications.

In the railroad industry, many new applications are planned. Some of them: Doors that open and close easily, floors and racks that resist wear and do not absorb moisture and odor, gondolas that resist corrosive attack and dump cleanly.

Major structures—bridges, drilling towers, and buildings—will gain in the next few years.

Photo courtesy of Jones & Laughlin Steel Corporation

BAKER'S MAGDOLITE AND JEBCOLITE
are always 5 ways better

Continued research and development throughout the years, plus The J. E. Baker Company's precisely controlled manufacturing methods, have resulted in the superior, properly burned, grain-sized Magdolite and Jebcolite particles which help provide:

More uniform ingots—increased ingot production—increased furnace efficiency—lower refractory costs—less defective production material.

Magdolite and Jebcolite* are the *original* dead-burned dolomites that offer better composition, preparation, strength, economy and quality. Don't say "dolomite." Save dollars. Specify Baker's Magdolite for open hearth and Jebcolite for electric furnace use.

** Jebcolite has the same superior chemical, physical and mineralogical characteristics as Magdolite and differs only in grain size which is designed specifically for electric furnace application.*

JEBCO
PRODUCTS
SINCE 1889

THE J. E. BAKER COMPANY
YORK, PENNSYLVANIA
PLANTS: BILLMEYER, YORK, PENNSYLVANIA — MILLERSVILLE, OHIO

D. L. LAVELLE
Central Research Laboratories
American Smelting & Refining Co.
South Plainfield, N. J.

T. E. EAGAN
Chief Research Metallurgist
Cooper-Bessemer Corp.
Grove City, Pa.

G. E. SEAVOY
Vice President
Whiting Corp.
Harvey, Ill.

RAY SUTTER
President
Sutter Products Co.
Holly, Mich.

1959 FORUM ON TECHNICAL PROGRESS

Casting

Automotive Uses Spark Aluminum Castings

—D. L. LaVELLE

• Automotive applications continue to be the brightest spot in the future of the aluminum casting industry. Much development work is being done toward the use of aluminum castings for such things as cylinder blocks, cylinder heads, and brake drums. In these applications, there is considerable interest in the hypereutectic aluminum-silicon alloys, containing as much as 25 per cent silicon, because of their attractive wear resistance. But some difficult machining and casting problems must be solved before the use of the high silicon alloys becomes widespread. One car today uses front wheel brake drums (conventional permanent mold cast) which have a ferrous liner.

Diecasting continues to equal the output of all other casting methods combined and shows strong signs of continued growth. The advent of a partial vacuum in the die cavity shows promise for improved surface finish, thinner walls, and sounder castings. The use of evacuated dies should also improve the possibility of obtaining aluminum diecastings that are suitable for decorative and anodized finishes.

Sand and permanent mold casting of SG70A and SC51A is paying off. The use of higher purity plus higher alloy content, advanced foundry techniques, and unconventional heat treatments is resulting in better castings. They have higher strength and ductility than was formerly considered possible on a production basis.

Future of Gray Iron Hinges on New Methods

—T. E. EAGAN

• In many instances, the future of the gray iron foundry industry will depend on the adoption of the newer technologies. This industry is being threatened by the lighter metals, especially in small castings. A number of the castings have already gone to aluminum, chiefly on the fact that the cost of the finished piece is less than when it was made of gray iron.

The gray iron industry is well aware of this tendency. It must introduce more and more refinements in molding practice, such as the introduction of shell molding to produce castings to closer dimensional tolerances. The other effort is to produce molds at lower cost by taking advantage of processes like air-set cores or CO_2 (both molds and cores).

The water cooled cupola, with or without preheated blast, is being installed in more and more foundries. It allows melting at a lower cost.

It also allows basic or acid operation.

The brightest spot in the gray iron field is the increasing production of ductile iron. Even during the slowdown in the production of gray iron, the output of ductile iron has more than doubled each year. It will continue to do so because of the improvement in the control of castings and the education of designers.

Capital Improvements Aimed At Foundry Improvement

—G. E. SEAVOY

• The pulling in of the belt has had a salutary effect in many ways. Marginal methods, maginal equipment, and marginal manpower have been eliminated. The urge and the need to operate at a profit will encourage the adoption of ways to cut costs to be more competitive as the market expands. I believe capital goods buying will first be concentrated on the improvement of installations rather than the building of capacity.

Possible examples: Modern hydraulic controls on electric furnaces, for fast melting; water cooled, liningless cupolas with water cooled tuyeres for operation with basic, neutral, or acid slags; the addition of air preheaters for cupola hot blast; low headroom cradle type mixers for the storage of hot metal between cupolas

JAMES H. SMITH
General Manager
Central Foundry Div., General Motors Corp.
Saginaw, Mich.

D. L. COLWELL
Vice President
Apex Smelting Co.
Cleveland

J. G. RAYNIAK
President
Outboard Marine Corp.
Waukegan, Ill.

CHARLES W. BRIGGS
Technical & Research Director
Steel Founders' Society of America
Cleveland

and steelmaking furnaces and for smoothing out the variables in the metal composition; improved overhead electric cranes with new hydraulic motors and controls for more accurate positioning and handling.

Sees Bright Future For Shell Molding

—RAY SUTTER

• In shell molded castings, the foundry industry has a new tool that permits:

1. Radical reductions in plant floor space requirements.
2. Reductions in plant labor costs, both productive and nonproductive, and plant equipment costs.
3. Improvements in product quality.

Normal improvement factor gains have already been promised to labor. A distinct process change is the only method to which management can turn to allow a larger return on its investment.

We look forward to increased acceptance of shell molding. We predict that some mechanical parts not yet produced by the casting process could easily be changed over and improved upon when shell molding techniques and new metals are considered on an over-all basis.

Atomic Byproducts Have Casting Role

—JAMES H. SMITH

• During the last ten years, technological progress has provided the casting industry with new processes and controls which have enabled us to maintain a much higher level of product quality. This progress has been important, but it may seem insignificant when compared with the strides that we expect during the next decade.

We are already finding ways to utilize the byproducts of atomic energy—but have barely scratched the surface. One has been the use of cobalt 60 radiography as a nondestructive testing tool. Another has been a recent development by our experimental engineers: Using radioactive isotopes to automatically control the moisture content of molding sand—a method which appears to be vastly superior to previous methods.

We are also exploring the possibilities of using isotopes to improve the melting procedure, to improve dimensional control, and as a new inspection medium. There is a further possibility that the physical properties of metals can be increased manyfold through the use of nuclear energy—thus leading to stronger, lighter ferrous castings. In brief, the atomic age is expected to provide new tools which will lead to an unparalleled period of technological improvement in the metal casting industry.

Aluminum-Silicon Alloy Meets Engine Challenge

—DONALD L. COLWELL

• Probably the most sensational development in aluminum casting during the year has been the renewed interest in the hypereutectic aluminum silicon alloys. Means of modifying the hypereutectic alloys with phosphorus have been perfected and alloys are being tested for gas engine use. The advantages of low coefficient of expansion, good wear resistance, and good castability in sand, permanent mold or diecasting seem to make it a natural for aluminum gas engine parts, including the cylinders themselves or liners for the cylinders, aluminum brake drums, and aluminum pistons.

The use of the higher purity grades of 355 and 356 continues to expand, particularly in the permanent mold field. One producer is offering ingots with an iron content guaranteed below 0.12, obtainable by the use of special low iron grade of silicon. The principal advantage of the lower iron content is in the higher elongation obtained.

Aluminum diecasting continues to grow in popularity. With increasing volumes of household appliances, small gas engines, and automobiles, the 1959 volume of aluminum diecastings should be tremendous.

The vacuum diecasting process has not proved the panacea for all diecasting problems, but it has proved helpful in many instances, and interest in the process is keen.

Progress Is Keyed To Drastic Thinking

—JOSEPH G. RAYNIAK

• New methods, materials, or processes must come from engineering and manufacturing groups that get together and find ways to improve or produce a better product at less cost—either through better manufacturing methods or better productivity. That covers a multitude of things for every manufacturer to do because there is always a better and cheaper way to make a product.

To continue our prosperity, a lot of drastic thinking will have to be applied to correct the many things that exist today. I think every manufacturer can solve his own problems and take part in the whole program.

Steel Casting Industry Researches Its Problems

—CHARLES W. BRIGGS

• The steel casting industry is engaged in an extensive study on tolerances applicable to steel castings with the purpose of passing along industry values to purchasers.

Collective research is being carried on by the industry toward the improvement of the surfaces of steel castings. The industry has experienced some accumulations of nonmetallic, glasslike material on casting surfaces which result in casting repairs by welding. It is expected that information on the causes and production

Casting

F. KERMIT DONALDSON
Executive Vice President
Steel Founders' Society of America
Cleveland

A. F. BAUER
Asst. Gen. Mgr. and Chief Engineer
Doehler-Jarvis Div., National Lead Co.
Toledo, Ohio

THEODORE OPERHALL
President
Misco Precision Casting Co.
Whitehall, Mich.

methods to prevent their formation will be disseminated to the industry during the fall of 1959. Incidentally, the research studies include the use of radioactive isotopes to determine the origin of the surface-included nonmetallics.

The subject of surface characteristics and inconsistencies in steel castings is being vigorously tackled and it is planned that a full set of reference photographs will be available to certain industries, especially the oil refining industry, illustrating various degrees of surface imperfections which can be employed by inspectors as visual standards.

Committee work has likewise been planned so that during 1959 reference radiographs on steel castings relating to castings of section thicknesses of 4 to 12 in. will be issued.

Steel foundries are showing considerable interest in leaded steels in casting form. Some interesting savings in machinability have been reported for lead-bearing steel castings. Interest is running high in this process and further steel foundry developments are expected in 1959.

Steel Castings Market Geared to Durable Goods

—F. KERMIT DONALDSON

• Since the end of World War II, the use of low alloy steel castings has increased from about 10 per cent of the total produced to about 35 per cent. This trend will continue as engineers are called upon to meet increased strength requirements coupled with decreased weight requirements.

The steel castings industry will have increased interest in market research and development during 1959. Concepts must be drawn of the markets of five to ten years hence based not only on physical tonnages but also on the effect of the technological changes.

Improvements in molding materials and techniques, with concommitant improvements in tolerance limits and surface finish, are resulting from research and development programs carried out over the last several years. They are placing the industry in a stronger position to compete with other methods of fabrication. These studies will be continued through 1959 and beyond.

Because of its dependence on durable goods, the steel castings industry is extremely cyclical. Operations reached a low point during 1958. The trend during the last quarter of 1958 has been upward, and based on the indicated improvement in capital spending should continue upward during the first half of 1959.

Diecasting Heads for Growth With Aluminum as Star

—A. F. BAUER

• For the first time in the history of diecasting, equipment has been enlarged so much that there is actually no limitation to the size or weight of diecastings.

This year and those to come will bring a continuation of the rapid growth of aluminum diecastings. The first one-piece transmission case in aluminum diecasting was so successful and showed such large savings that all the automotive companies are designing their transmission cases exclusively in aluminum. These transmission cases alone may increase the consumption of aluminum diecastings by 40,000 tons a year.

The developement of engine blocks in aluminum diecastings is somewhat slower, because of the basic problems involved in the use of aluminum. The main problems are a proper cylinder bore material or coating to overcome the low wear resistance of aluminum, and the search for a crankshaft bearing design which will compensate the higher coefficient of expansion of aluminum. It can be expected that the first 6-cylinder engine blocks in aluminum diecasting will be produced in 1959, but mass production will not start before 1960 or 1961.

The coming years will also bring more automation in the diecasting process. Automatic ladles, a must on large diecasting machines, will be favored more and more on medium size machines to reduce operator fatigue. Cost reduction and greater uniformity of the quality of diecastings will be achieved by gradually eliminating the variables caused by the manually controlled portion of the casting cycle.

For the years ahead, the increase in diecasting consumption will continue in the well-established diecasting alloys, zinc, aluminum, and magnesium. With large marked potentials for transmission cases, bimetallic wheels and, perhaps, engine blocks, already established, aluminum diecastings will show by far the largest growth. Total aluminum diecasting consumption will more than double and pass the 1 billion lb mark during the next three to five years.

It is expected that diecasting consumption in the coming years will far surpass combined consumption of sand and permanent mold castings.

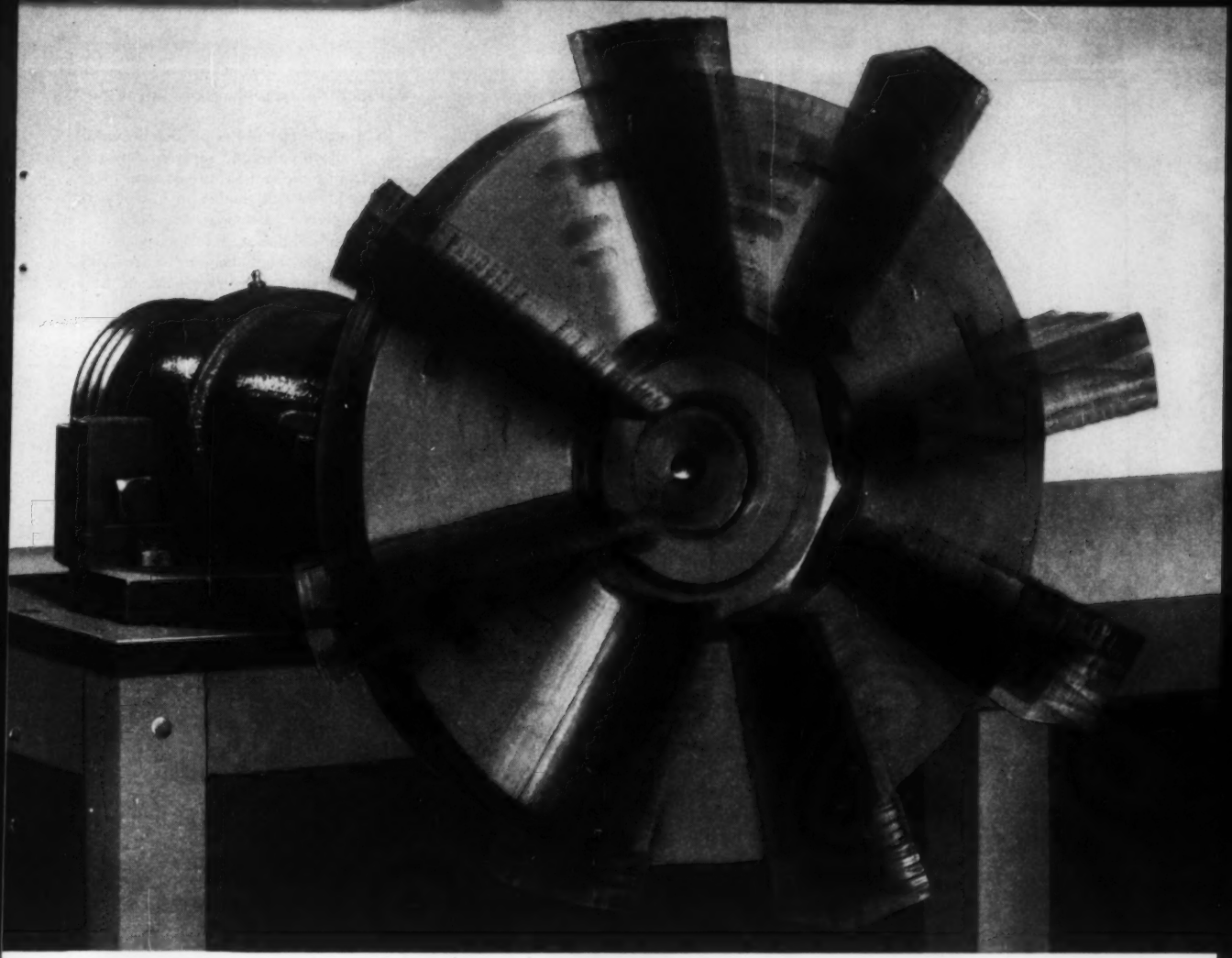
Investment Casting Eyes Critical Jobs

—THEODORE OPERHALL

• The demands of Mach 3 aircraft, missiles, and space age vehicles are posing new problems for the investment casting industry. Many new alloys are being developed for jet engine turbine blades that will require 100 hour qualification at a temperature of 1800° F and stress levels of 20,000 psi.

Alloys such as U-500, U-700, 713, Nicrotung, and WI-52, exhibit their best properties when poured from vacuum primary ingots and vacuum cast.

To permit greater latitude in design and to improve quality of the product, we have seen the introduction of the ceramic shell process. These new techniques have promise of providing new fields of application because the shells



"Rotoblasting" a profit pattern

Pangborn Rotoblast Wheel gives you minimum blast cleaning costs.

This cutaway view of power-in-motion spells *efficiency* . . . the efficiency of Pangborn Blast Cleaning Machines.

The Pangborn-developed central impellor design makes possible high abrasive discharging capacity at high efficiency. Up to 160,000 lbs. of abrasive an hour can be efficiently handled by these Rotoblast Wheels. Service ease and reliability are assured by Pangborn vane locking design. Permanent factory alignment of running parts and bearings, plus the lubrication system, permit wheel spindle mounting at any angle. It is this kind of engineering—whichever size Rotoblast Wheel *your* Blast Cleaning Machine needs—that lowers cost by giving you maximum production with a minimum of maintenance.

Pangborn Blast Cleaning Barrel—one of a complete line of Pangborn machines utilizing the cost-cutting principle of Rotoblast cleaning.

The Pangborn Engineer in your area will be glad to go to work on your cleaning problem at no obligation. And for complete information on Pangborn Rotoblast Wheels, write to Pangborn Corp., *1600 Pangborn Blvd., Hagerstown, Md., Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn cleans it fast with ROTOBLAST®

Casting

CHESTER V. NASS
Vice President, General Manager
Beardsley & Piper Co., division
of Pettibone Mulliken Corp.
Chicago

M. E. BROOKS
Foundry Engineer, Magnesium Products
Dept., Dow Chemical Co.
Midland, Mich.

HARRY M. ST. JOHN
Foundry Consultant
Ft. Pierce, Fla.

HANS J. HEINE
Technical Director
Malleable Founders' Society
Cleveland

are produced by a series of dipping operations which avoid many of the problems common to the old type monolithic mold.

In the field of structural airframe components, our industry has yet to provide the product demanded by the user. But the problems are great because quantities are low, the components complex. Their varied section size require Zyglo, x-ray, and surface qualities near perfection.

The shell process may provide many of the solutions to the difficulties encountered with the conventional investment process. Here again we must anticipate the needs. A technique must be developed which may be a modified ceramic shell process. It will probably be a cope and drag system capable of being preheated to elevated temperatures so that thin sections can be filled, and it must be free of organic materials after firing because it is likely that the components will be poured in a vacuum furnace.

Foundries To Seek Efficiency Through Latest Improvements

—CHESTER V. NASS

• With the economy of the country in a definite upswing, the foundry industry, after a more prolonged period of decreased activity than was predicted, is setting its sights for the increased business ahead.

Improved production, improved quality product, and in-line costs must be the immediate goal of the foundry industry. The costs of labor, our most expensive commodity, will continue to increase and the so-called improvement factor, demanded by labor as an annual increase, has in fact become a pattern. Foundries cannot continue to pay this without having the advantage of it, and this can be attained only by improved production through new processes, new methods, up-to-date equipment and modern controls.

New, efficient, low-cost sand reclamation is providing opportunities for cost savings not before attainable. Improved, yet simplified, controls are being provided for practically every phase of the processing of materials for and the actual making of all types of castings.

Engineering Successes Point To More Magnesium Castings

—M. E. BROOKS

• Two significant trends in magnesium sand casting will probably continue for several years to come.

First, the type of castings being made is changing. Fewer heavy-walled aircraft wheels and engine castings are being designed. More thin-walled parts are being cast for engines, control mechanisms, and a variety of other functions in aircraft and missiles.

A second trend is toward the increased use of alloys possessing superior elevated-temperature properties. In addition, magnesium alloys with higher room-temperature properties have been developed.

Another significant development is the use of a new high damping magnesium alloy, both sand cast and diecast, in electronics equipment requiring exceptional vibration resistance.

Shell cores are being used increasingly in both sand and permanent mold castings. CO_2 cores have brought closer dimensional tolerances while waterless molding sand has improved surface finish.

Successful engineering of many magnesium automotive applications in the past indicates that die and permanent mold castings of this metal will be used at many times the present volume in future automobiles. The development of a magnesium cold-chamber diecasting process with metered automatic feed shows promise of improving the production economics of this metal and should enhance the position of magnesium diecastings in all markets.

Brass and Bronze Castings Keyed to Modern Practice

—HARRY M. ST. JOHN

• Molding sand technology has reached a point where one thing seems fairly clear. Naturally bonded sand in its natural state can no longer be considered adequate. New sands must be blended with one another and with reclaimed sands. Bonds must be added in proportions carefully calculated to produce a desired result. Some additives, such as wood flour, have proved their usefulness. Certain chemical additives are promising. Sand mixtures need to be tempered and conditioned and their finished properties tested before use. Automatic sand conditioning systems are costly to install and maintain. They are justified only when much labor can be saved. The small foundry will tend to use facing sand, with cleanliness and physical properties closely controlled.

Automatic molding has not reached a point where it is suitable for the small foundry, but considerable improvement can be made in the mechanical handling of molds and castings. Harder molds and patterns designed more closely to finished dimensions will result in less machining and less nonproductive metal in the form of machine turnings.

Look for Ferrous Castings Cast Directly from Ore

—HANS J. HEINE

• The revolutionary tendency to locate foundry facilities close to aluminum reduction plants may well usher in a dec-

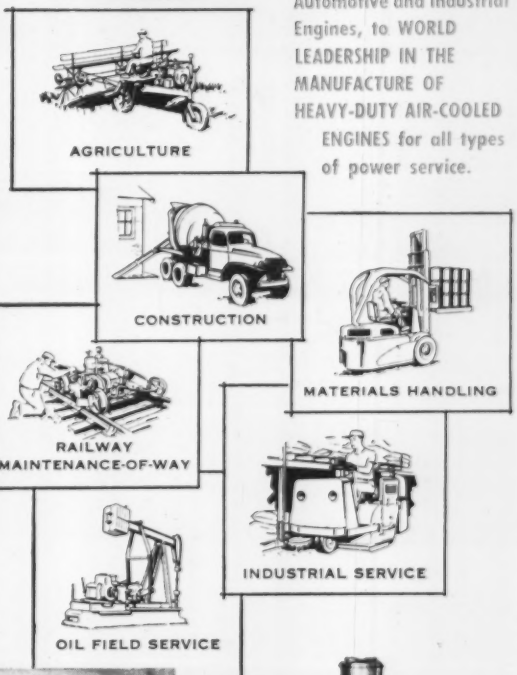
How YOU- can benefit from-

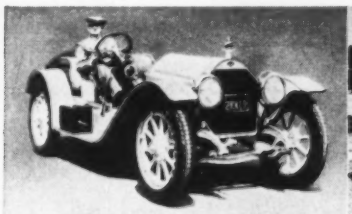
This year of 1959 is the Golden Anniversary of Wisconsin Engines. It heralds 50 years of continuous engine progress. Fifty years of engineering development and exclusive specialization in the design and manufacture of engines.

- From the very first, over a span of 50 years, Wisconsin Engines have been leaders in the internal combustion engine field from the standpoints of *quality* and *performance* . . . with direct benefit to *you* as a power user.
- Originally manufactured in a power range up to 200 hp., Wisconsin Engines helped to make automotive history as well as supplying dependable power for many industrial applications — service that called for the most advanced engineering.
- Heavy-duty design and construction and High Torque performance have been traditional features of *all* Wisconsin Engines. You get longer life from Wisconsin Engines and lowest cost maintenance.
- Today the Wisconsin line comprises the most complete line of Heavy-Duty Air-Cooled Engines in the industry. They are supplied in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder models in a complete power range from 3 to 56 hp. There is a Wisconsin Engine of the right size and type to fit the job and the machine.
- Every Wisconsin Air-Cooled Engine is designed for heavy-duty service under all climatic conditions from low sub-zero to 140° F. You get the *Most Engine* for your money for MOST HP. HOURS of service.
- For 1959 Wisconsin has available a complete line of factory-built LPG Engines (including conversion kits for field installation on Wisconsin gasoline engines). In addition, we offer a new line of heavy-duty, quality-built Vertical Shaft Engines, from 3 to 7 hp.
- More than 2000 convenient Wisconsin Authorized Service Stations stand ready to provide expert servicing and factory-built parts for all Wisconsin Engines.

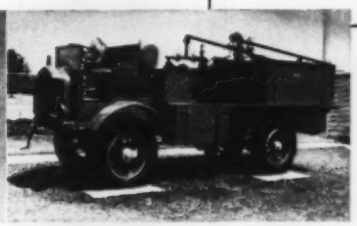
Constructive experience is a priceless asset. The benefits to the manufacturer, distributor and user of power equipment are many. You are best served in all respects when you specify "WISCONSIN ENGINES"... *for better service, low-cost maintenance, trouble-free operation and long engine life.* Write for engine bulletin S-237.

from water-cooled Automotive and Industrial Engines, to WORLD LEADERSHIP IN THE MANUFACTURE OF HEAVY-DUTY AIR-COOLED ENGINES for all types of power service.

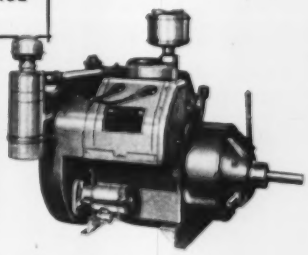




This 1914 Stutz Bearcat, one of the most famous and rugged cars of its day, was powered by a Wisconsin Heavy-Duty Water-Cooled Engine . . . a power leader of high recognition even at that early date.



This FWD Wisconsin-powered truck, known as "No. 28," was purchased in 1921 from Army Surplus, and after many years of service is now on display at the Halliburton Oil Cementing Co., in Oklahoma.



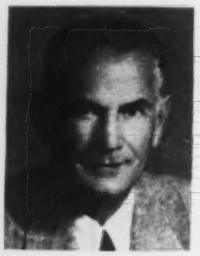
WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

A8-6226-1PC

Casting



L. G. VANDERHOFF
Vice President and Gen. Mgr.
Stewart Die Casting Div.
Stewart-Warner Corp.
Chicago

W. E. SICHA
Chief, Alcoa Research Laboratories
Aluminum Co. of America
Cleveland

EINAR A. BORCH
Executive Vice President
National Metal Abrasive Co.
Cleveland

ade of spectacular progress for the casting industry. A corollary will be developed for the ferrous foundries; in fact, it may eventually become a question of primary importance for the producers of malleable iron components. Recent developments indicate that the production of ferrous castings directly from ore may be a reality—several methods are in pilot production in England and on the continent.

Metallurgical developments, such as economic direct reduction, will be followed by expanding markets for the malleable casting industry. Looking beyond the age of the jet propelled airplane, we envision the use of an atomic powered air vehicle. Since weight will then no longer be of primary importance, ferrous castings will come into their own. More extensive use of malleable iron as a material of construction is also in prospect for ground equipment.

Research on hot pressing could lead to malleable castings with close dimensional tolerances. The parts will be free from residual stresses, since the pressing is done at temperatures where stresses are relieved.

Looks for Much Activity In Casting Research

—L. G. VANDERHOFF

• We look forward to '59 as a formative year, with considerable enthusiasm for process and material developments of major importance.

Progressive developments toward further automation of our highly productive equipment already show great promise in field tests. This year could well be most eventful in the direction of solidifying fully automatic machine designs of wide operational scope and improved vacuum casting techniques.

To meet the needs of modern technology, national task groups of engineers are busily engaged in many processing projects. Our industry activity in research seems well on its way toward establishing fixed yardsticks of processing controls.

Diecasters Eager To Get Going On Proposed New Applications

—W. E. SICHA

• The already publicized interest of auto manufacturers in aluminum cylinder blocks and cylinder heads certainly will have an impact on the aluminum casting industry. Decisions apparently still have to be made in attaining a compromise between cylinder block design and casting process to obtain the most economical finished and installed cylinder block. Active consideration is being given to aluminum-silicon alloys containing from 15 to 25 per cent silicon for cylinder block production to gain improved resistance to wear. Spray coating of the hypereutectic aluminum-silicon alloys on the cylinder walls of blocks, cast of an established commercial aluminum alloy, is receiving attention as an alternate approach. More extensive use of aluminum brake drums and transmission housings also can be expected.

Pumping of molten aluminum from the melting furnace to the mold offers potential advantages and has been under investigation for many years. The major problem has been finding suitable materials for pump components and piping that would not be attacked by the molten aluminum. Further work on materials will be required to learn whether pumping will be economical.

The highest degree of interest in premium strength castings has been displayed by aircraft frame manufacturers. Greater use of such castings should develop in aircraft frame construction, and also in other applications where the higher tensile properties will permit weight reduction. Castings conforming to closer dimensional tolerances than those previously established for commercial castings are available.

There is evidence of a market for ornamental castings anodically coated to provide bright and colored finishes.

Modernization Cited as Today's Biggest Need in Foundry Field

—EINAR A. BORCH

• In the years immediately ahead, technological improvement of equipment will continue the fast pace of the last decade. However, greater emphasis will be placed on design and engineering development of features tailored particularly for the medium to small foundry operation, giving recognition to the modernization needs of the approximately 80 per cent of foundries with employment under 100.

Equipment sales in 1955, 1956, and 1957 stemmed primarily from expansion needs of the large foundry operator. Total foundry capacity doubtless is more than adequate for projected production requirements for several years ahead. Replacement and modernization is the big need of the foundry industry in 1959 and 1960.

An even greater challenge exists, however, within the foundry industry: It is the need of economic and financial improvement so the industry can avail itself of the technological improvements present in up-to-date foundry equipment.

The bulk of all capital equipment expenditures stems from retained profits and from depreciation reserves. Profits of the smaller foundry have been extremely low, or even nonexistent, since mid-1957. In addition, few, if any, foundry operators actually fund, or even earmark, depreciation deserves for future equipment replacement. Instead, the reserves are absorbed into working capital.

Perhaps the greatest challenge before us is that of joining with other industries in a renewed effort to reform present depreciation handling in our tax structure. Perhaps, too, such reform should contain a built-in self-protection feature assuring that the full benefits of tax relief afforded through depreciation reform can be realized only if depreciation reserves accumulated on equipment are used for eventual equipment replacement.

CONVENIENCE

By merely picking up your phone and calling your Steel Service Center, you can order for immediate delivery exactly the steel you need.

It's as easy as super-market shopping because your Steel Service Center stocks every type of steel and will process your order to fit your production schedules. You can save on inventory investment and storage space, too.

Alan Wood supplies major Steel Service Centers with a variety of top-quality steel products. Your nearest Steel Service Center is listed in the Classified Telephone Directory.

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN • PENNSYLVANIA

DISTRICT OFFICES AND REPRESENTATIVES:
Philadelphia • New York • Los Angeles • Atlanta • Boston • Buffalo • Cincinnati • Cleveland
Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle
Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Limited

WALTER E. JONES
Vacuum Melting Section
Metallurgical Products Dept.
General Electric Co., Detroit

T. W. GABRIEL
Vice President—Commercial
Jessop Steel Co., Washington, Pa.

CARL B. POST
Vice President & Technical Director
Carpenter Steel Co., Reading, Pa.

WALTER L. FINLAY
Director of Research
Crucible Steel Co. of America
Pittsburgh

1959 FORUM ON TECHNICAL PROGRESS

Materials and Metallurgy

Changes in Vacuum Melting May Reduce Alloy Costs

—WALTER E. JONES

• We feel that the induction vacuum melting is the true specialty metal process. It has made possible full scale production of completely new alloys and families of metals that cannot be made any other way.

Production capabilities are well determined. One of the newest alloys, Rene 41, has surged from the laboratory-pilot plant stage to commercial production in less than a year.

The years immediately ahead should see some important changes in vacuum melting. One necessary change will be closer control of the molten metal in relation to the finished part. The billet will be not a preparatory step to later forging but will give way to a semi-finished part with tolerances reasonably close to the item as used in production.

Part of the technological problem is the ability to predict and adjust the internal structure of the molten metal before, during, and after solidification. Once it is licked, the possibilities of extending the use of the vacuum melted alloys will be unlimited.

Castings with high fatigue strengths and combinations of good mechanical properties will replace the more expensive forgings; materials will be cast much closer to final size, as in the case of sheet slabs or the continuous casting of hot strip. The direct result of this cost saving will be the availability of high performance, high strength materials within the direct reach of everyday applications.

Metal Requirements Changing, Producers Need New Methods

—T. W. GABRIEL

• The greater cleanliness requirements and higher physical properties needed by metals at elevated temperatures have put a premium on metallurgical and development research.

At the same time, the concept of long-time physicals has changed to high physicals at high temperatures for periods measured in minutes. The exclusion of tramp elements and gases in even minute quantities has grown in importance as we learn more about residual effects.

Those indications point to a new era in specialty steelmaking over the next decade. It will require applications of new production methods and equipment, as well as new means of physical and chemical testing.

A continuing growth market for stainless, alloys, tool steels, and superalloys is indicated by these specialized demands. The new requirements will be superimposed on an expanding market for the less romantic but more normal and steady need of these grades for domestic and industrial uses.

Coming Products Will Use More Vacuum Melted Alloys

—CARL B. POST

• This year we will see a rapid expansion in vacuum induction and consumable electrode melting. The greatest increase will come in the manufacture of high temperature materials and other alloys requiring a more consistent product and less scatter in physical properties.

Vacuum melting processes will also be applied more extensively in atomic energy, where one component failure can ruin a multimillion dollar installation. More steel for critical machine tool parts will be vacuum melted, especially where they are involved in an automated setup, the failure of which can shut down an entire assembly line.

Welded stainless steel tubing will find more application in the electrical power generating industry. It is already beginning to displace certain forms of admiralty metal tubing in heat exchange applications.

Improved methods of welding and fabricating welded tubing have enabled the formed steel tube industry to meet the

W. B. PIERCE
Vice President in Charge of Sales
Allegheny Ludlum Steel Corp.
Pittsburgh

WILBUR T. BOLKCOM
President, American Metallurgical
Products Co. Inc., Pittsburgh

J. H. BECHTOLD
Manager, Metallurgy Dept.
Westinghouse Electric Corp.
Pittsburgh

M. J. DAY
Vice President—Technology
Crucible Steel Co. of America
Pittsburgh

most stringent requirements. To keep up with demand, our own tube division as well as those of other producers will make products in a growing variety of modern alloys, including high temperature alloys, exotic metals, and stainless steels for severe corrosion resistance.

Magnetic alloys such as HyMu 80, a 79 per cent nickel-iron-molybdenum alloy, and High Permeability 49, a 49 per cent nickel-iron alloy, will come into greater use by the electronic industry this year.

High Strength Titanium Alloys Will Be Evaluated This Year

—WALTER L. FINLAY

• The most noteworthy titanium alloy development last year was the introduction of three Formageable (formable in the soft condition, ageable to high strengths) titanium sheet alloys, including the first beta titanium alloy, B 120 VCA.

With development sheet samples exhibiting strengths exceeding 250,000 psi, B 120 VCA has among the highest (perhaps the highest) strength-weight value of any structural metal sheet. It is expected that B 120 VCA, and the other Formageable titanium alloys, will be extensively evaluated for advanced aircraft and missiles this year.

Another significant 1958 titanium development of growing importance in civilian markets for 1959 and future years: An extremely thin (a few millionths of an inch) coating of platinum on titanium gives titanium the better corrosion resistance of platinum even though the coating is not continuous.

Outlook for Stainless Good; More Nickel Is Bright Spot

—W. B. PIERCE

• This year could see the start of a new upsurge in growth for stainless.

Flat-rolled capacity has been substantially increased with the startup of new mills, particularly Sendzimirs. New bar mills and forging presses also have increased the industry's capacity for producing stainless and alloy bars, rods, and wire.

Another encouraging element in the outlook is the increased availability of raw materials, notably nickel. Producers of nickel and other raw materials are already stepping up their sales promotions.

Basically, we look for growth of stainless to come from steady improvement and extension of present markets, not spectacular new applications.

Perhaps the most interesting of our market opportunities is the missile field. Still in development stage, with rapid changes in design, this market will continue to test the skills of the makers of special steels. We are alert not only to new uses for stainless but also for the vacuum melted, high temperature alloys for tool steels and certain low alloys processed to missilemakers' specifications.

Cerium-Containing Solders Boost Auto Radiator Life

—WILBUR T. BOLKCOM

• We anticipate a major development in the use of solders in the metalworking industry during 1959. The key to this technological breakthrough is the rare earth metals.

A controlled research project (at the Battelle Memorial Institute, Columbus, Ohio) showed that the life of an automobile radiator could be increased five or six times by using a solder containing 70 per cent or more of tin with certain additions of cerium. The cerium was used both in its isolated state and in the form of misch metal containing about 50 per cent cerium.

We have learned through research that misch metal is at least comparable—and sometimes superior—to the isolated and more expensive cerium in joining stainless, low alloy steels, iron, aluminum, and brass.

Future Alloys Will Come from Tungsten, Tantalum, Rhenium

—J. H. BECHTOLD

• The quest for materials for use at ever higher temperatures will focus the attention of many metallurgists on alloys of the three highest melting point metals —tungsten, tantalum, and rhenium.

From those elements, all of which melt above 5000° F, will be developed the alloys which will support the highest loads at the highest possible temperatures (2500° F and up) achievable with metals. The problems to be solved are formidable, but the potential rewards are equally great.

Research during the last decade on molybdenum and more recently on columbium has resulted in the development of a number of strong and useful high temperature alloys which are beginning to become important in aircraft and missile components.

The mill products of those alloys are still not fully satisfactory and improved techniques are needed for melting, forging, and rolling. Forming, joining, and coating problems that arise in applications in engineering structures must also be solved.

New Superalloys Coming, Refractory Metals To Grow

—M. J. DAY

• Rapidly expanding technology with regard to oxidation and corrosion resistance at elevated temperatures will provide new metals and alloys for the demands of the rocket, missile, and space vehicles under development.

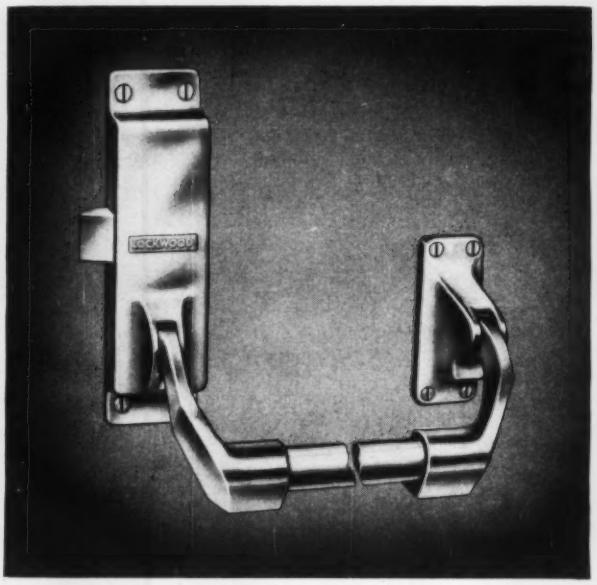
New or improved superalloys will appear. The so-called refractory metal group (molybdenum, tungsten, columbium, vanadium, beryllium, tantalum, etc.) will progress from research and development to varying degrees of commercial production. New, important applications of a military

(*Please turn to Page 246*)

Fire!

. . . and USS American Music Wire

CRUCIAL. In the hands of a skilled workman the vital spring goes in place in the Lockwood "Lock 'n Roll" panic exit device. In times of emergency and panic the lives of thousands of people depend upon the unfailing action of this little spring.



EVER READY to release and open the door at the lightest touch. Held in place in the "Up" position by the spring of USS American Music Spring Wire, this panic latch will open easily, smoothly at the touch of a finger tip.

CROWDS of children leaving a burning school—their safety depending upon the open door and on the smooth, perfect operation of the panic opening device. Latches of this kind are designed to meet and pass a supreme test of efficiency—a test they will probably never need to undergo. But should an emergency occur, the latch must operate completely and perfectly.

Because this "Lock 'n Roll Latch" panic exit device serves so vital a purpose, because it must give long, unfailing service, must open easily, instantly every time it is touched, the Lockwood Hardware Manufacturing Company, Fitchburg, Mass. spares no effort in design, manufacturing and selection of material to make this latch as perfect as possible.

For the latch to operate properly, the cross bar must remain in the "Up" position, ready to release the door at the lightest touch. To hold the bar in this position is the job of a very vital, specially designed spring—made of USS American Music Spring Wire.

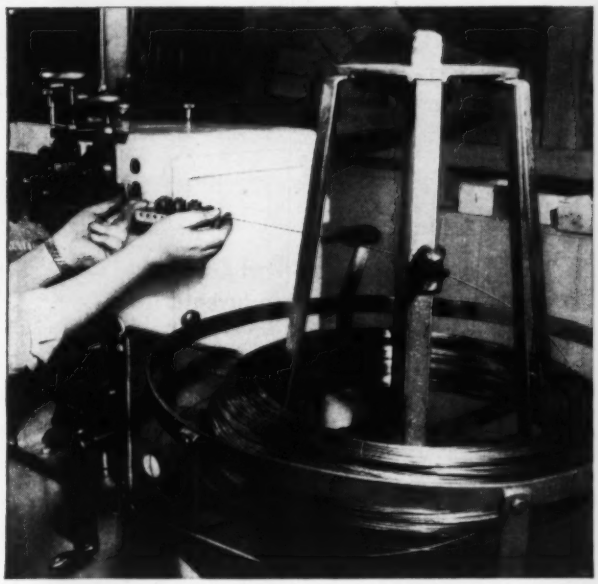
In their search for a wire to make the spring for the panic exit device, the Lockwood Hardware Manufacturing Company selected USS American Music Spring Wire for its complete dependability, its consistent uniformity and its superior quality. The experience gained in 125 years of wire drawing and manufacturing has stood American Steel & Wire in good stead in supplying the high-quality Music Spring Wire required by the Lockwood Hardware Manufacturing Company.

If you have a product involving the use of spring wire or any other type of wire, get in touch with American Steel & Wire. The same controlled quality, dependability, and uniformity are available to every fabricator who uses USS American Manufacturers Wire in the products he produces. Just write to American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

American Steel & Wire Division of USS **United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors • United States Steel Export Company, Distributors Abroad

makes sure the door opens!

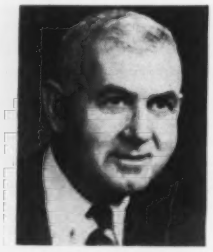


8,000,000 A MONTH. Shown here USS American Music Spring Wire is being fed into a Sleeper & Hartley spring coiler. The Lockwood Company uses ten spring coilers and one torsion machine to produce the 8,000,000 springs they use a month.

INSPECTION. Important final inspection for Lockwood spring assures that this spring will have the necessary dependability and reliability to meet the rigid requirements of a panic door exit device used on schools and other buildings.

Materials and Metallurgy

WALTER E. FROEHLICH
Vice President, Associated Spring Corp., Bristol, Conn.



F. L. LaQUE
Vice President, International Nickel Co. Inc., New York

GEORGE A. ROBERTS
Vice President—Technology Vanadium-Alloys Steel Co. Latrobe, Pa.

C. L. HARDY
President, Joseph T. Ryerson & Son Inc., Chicago

and commercial nature will be found for titanium, zirconium, and their alloys.

Radical changes in primary methods of metal manufacture, by minimizing the conversion steps from raw material to finished product, are anticipated. Expansion and improvement of new techniques in melting procedures, such as vacuum melting and degassing, gaseous and liquid protective blankets, levitation and electron beam melting, will result from technical and scientific efforts for highly specialized requirements.

Problems will be development of adequate equipment for sizes and tolerances required and effective use of electronic calculators and similar equipment to accomplish goals with a minimum of time and effort.

Springmakers Need Help From Material Suppliers

—WALTER E. FROEHLICH

• This will be one of the major years for contributions to precision spring progress in the "soaring sixties."

The spring industry needs better materials, better knowledge of methods and processes, and better knowledge of spring design.

Material requirements include better surface finish, closer tolerances with less variation, and better fatigue properties. Better materials for use in wider temperature ranges (minus 100 to plus 1500° F) are needed.

In the area of improved methods and processes, spring manufacturers are faced with increasing labor costs. This is partly offset by technological improvements, but we need further improvement. The springmaking equipment builder has a definite obligation in that area.

Progress in the spring industry is pretty much controlled by the supplier of materials. To satisfy his customers' needs, the spring manufacturer must at all times work closely with his material supplier. The spring designer, whether in a springmaking or spring using organization, should understand and appreciate these problems. He can be of extreme help in this area.

Major Uses for Nickel Being Developed in Many Fields

—F. L. LaQUE

• Progress in the "soaring sixties" will depend in large degree on advances in the properties and utilization of metals. We can anticipate continuing challenges to the metallurgists to come up with even more rugged products.

Nickel will continue to make its contribution, both as a base for alloy building and as a potent enhancer of the properties of other metals. With the ample quantities guaranteed by the new nickel production facilities that will come into operation in the sixties, there should be no question of supply to restrain the advantageous use of the metal.

We can anticipate important additions to the list of major uses of nickel, such as in nickel cadmium batteries, automotive gas turbines, devices for converting salt water into fresh water, nuclear powerplants, equipment for transportation and storage of liquefied gases, structures and vessels made of heat treated alloy steels in plate forms, plants for generating steam at supercritical temperatures and pressures, and equipment for heating and cooling living quarters by electrical devices.

Steady Growth Seen for Vacuum Consumable Electrode Steel

—GEORGE A. ROBERTS

• Advances during 1959 in specialty steels, it is predicted, are specifically related to quality rather than quantity.

Special steels are being rapidly developed for high temperature applications in aircraft and missiles. The temperatures under consideration are frequently in the range 400 to 1300° F.

Alloys of the austenitic and precipitation hardening categories previously developed for applications at elevated temperatures, even beyond 1300° F, are not applicable. The demand is for high strength and high wear resistance in these areas that require martensitic, hardenable materials with a high resistance to temperating or softening.

A second need will be met by the continued expansion in the use of vacuum melted steels. A steady growth in the quantity of steels melted by the vacuum consumable electrode process is anticipated. This anticipation is based on more favorable economies in certain instances and on the fairly sound technical belief that such steels can continue to be improved as vacuum melting equipment, especially designed for steelmaking purposes, is brought into production.

New Tools Will Cut Peaks, Fill Valleys in Inventories

—C. L. HARDY

• The problem of smoothing out severe inventory fluctuations and lessening the wide fluctuations in industrial production rates is common to most types of industry.

The steel industry is more fortunate than most because it has fewer levels of distribution. Although the general line industrial steel warehouses serve to reduce fluctuations by pooling the inventory requirements of a broad group of customers from diverse industries, they too are confronted with the problem.

Improving the condition depends on better controls. Faster order handling and communication offer a possibility of

Cold Rolling Puts a Tougher Face . . . on an "Old Salt"

To increase fatigue resistance, endurance limit and to fight the corrosive action of the sea, Erie Forge & Steel technicians cold roll ship's tail shafts as illustrated above. The life of the forged steel tail shaft is prolonged by cold rolling under the propeller and the after bearing. The surface toughness thus effected reduces fretting corrosion, minimizes pitting, costly failures and the hazard of propeller loss at sea.

Cold rolling is applied not only to new shafting but also for reconditioning existing ship's shafts, thus saving sizeable replacement costs in many instances.

Designed and built by Erie Forge & Steel engineers, the machine cold rolls shafts of any length and up to 30 inches in diameter. Any desired pressure up to 37,000 pounds can be exerted by the hardened steel rollers on each side of the shaft.

The Society of Naval Architects and Marine Engineers recommends that all ship's propeller shafts be cold rolled as a safety measure. This cold rolling process is approved by The Bureau of Ships, United States Navy.

Another of the special services characteristic of the continuing progress in steel improvement at Erie Forge & Steel. Let us work with you on your steel forging and casting requirements.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

MEMBER AMERICAN IRON AND STEEL INSTITUTE

Materials and Metallurgy

N. W. BASS
Vice President, Brush Beryllium Co.
Cleveland

W. C. CLEMENTS
Metallurgical Engineer
Bethlehem Steel Co.
Bethlehem, Pa.

MILO J. MARSH
Executive Vice President, Ohio Rubber Co., division of Eagle-Picher Co., Willoughby, Ohio

CHARLES E. NELSON
Technical Director, Magnesium Products Dept., Dow Chemical Co.
Midland, Mich.

reducing the lag. Better sales data and better usage of forecasts are requirements for improvements.

Some of the tools for making progress in this area are the new developments in data processing, the new concepts of decision making, the techniques of simulation, and the theory of information feedback systems.

The manager of the future will be concerned not so much with day to day crises as with the establishment of policies and plants that minimize emergencies. He will recognize the ebb and flow forces which interact to generate fluctuating economic conditions. He must learn to appreciate the power of the new tools and encourage the development of men within his organization who can use them.

Aircraft and Nuclear Uses Boost Beryllium Consumption

—N. W. BASS

• Interest in beryllium for advanced high speed aircraft, missiles, and outer space vehicles advanced at an accelerated pace during 1958.

Applications of current interest include inertial guidance gyro and gimbal parts, missile nose cones and other re-entry components, aircraft brake discs, and airframe and structural parts of hypersonic aircraft and missiles.

While beryllium is sufficiently ductile for many applications, it would be desirable in some to have an improvement. Considerable development effort, both industry and government sponsored, is in progress.

Intensive development work in other areas of beryllium technology is also underway. They include rolling, forging, extrusion, composite bodies, missile structures, crack propagation, joining, and casting. Industrial health and safety aspects are also being investigated.

In addition to its airborne uses, substantial quantities by beryllium continue to go into nuclear applications. Intensive interest in the possible use of the metal as the fuel element jacket in gas-cooled power reactors has been evidenced in Great Britain and elsewhere.

Requests for Special Material Properties Reported on Increase

—W. C. CLEMENTS

• It is becoming increasingly necessary that all information on the end use of a material be made available to the producer.

Most consumers of steel are becoming more specific in their requirements for special material properties. Their requests demand a better understanding and evaluation of such features as composition of the material, surface and internal characteristics, as well as inherent grain size, structure, and what properties may be developed by heat treatment.

Steel designed for a specific application is a commodity. The unique properties of each commodity are developed by employing a combination of compositions, qualities, and specific manufacturing or processing practices. The details of manufacture may vary with different producers, but the characteristics of the finished material must be such that the product satisfactorily fulfills the application or end use requirements.

To obtain such information, many steel producers employ large staffs of specialists who are familiar with manufacturing procedures of the supplier and the consumer. Those metallurgists are technically trained experts with many years of experience. Their services are generally available to most consumers upon request, and the use of their special talents has proved extremely beneficial to all concerned, customers as well as steel producers.

Improved Rubber Materials Will Upgrade Metal Products

—MILO J. MARSH

• Use of rubber and rubberlike materials by the metalworking industry is expanding rapidly. The increase is sparked by new and improved materials and methods which greatly expand the range of applications, and by changing design concepts.

A significant trend in machine design is reduction of noise and vibration far below levels which were considered acceptable. It is becoming of increasing concern to manufacturers of machine tools, metalworking and printing presses, and office machinery.

Among the new materials, urethanes are assuming a major position among elastomers. They are tough, abrasion resistant, and they absorb vibration.

Processing developments include new bonding techniques and materials which expand the choice of elastomers and metals (and plastics) which may be bonded together. An example, now in mass production, is a metal gear bonded to a rubber torsion member which in turn is bonded to a nylon gear.

A market now assuming major proportions, and holding great future promise, is the production of rubber or vinyl sealing strip for curtain-wall buildings. Another development, still under investigation by the automotive industry, is the use of urethane material in new types of front-end suspension systems, offering the possibility of suspensions good for the life of the car without lubrication.

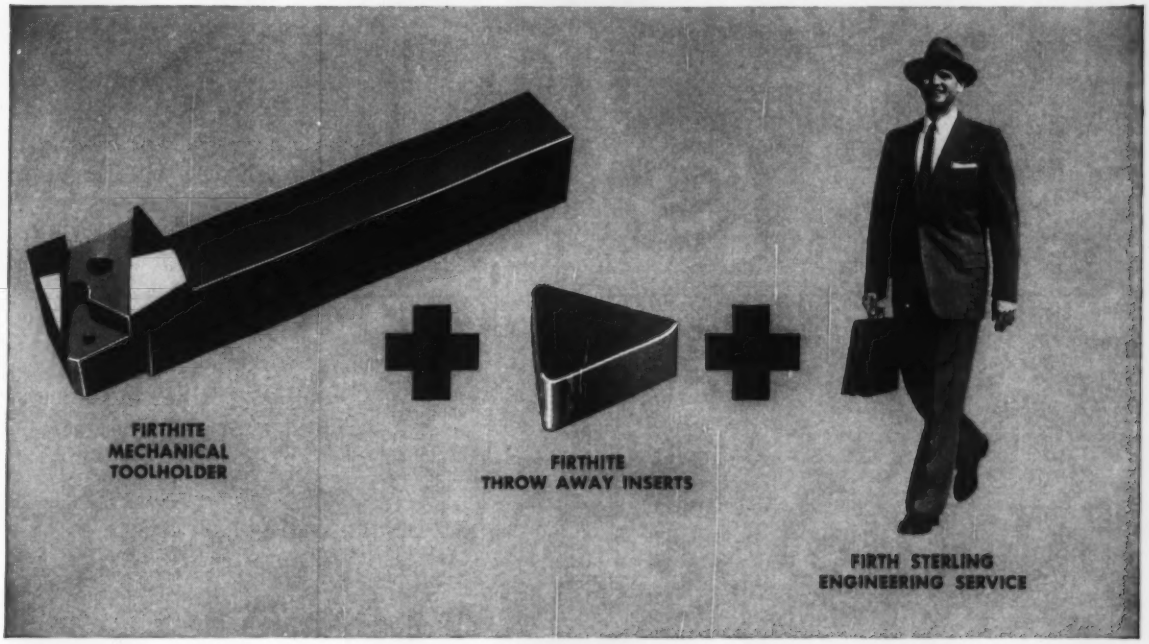
Magnesium Wonder Alloys Will Reach Market This Year

—CHARLES E. NELSON

• Watch cold-chamber diecasting with metered automatic feed. It probably is the magnesium process that will have the

Firth Sterling . . .

PIONEER IN POWDER AND MOLTEN METALLURGY



TOOL UP FOR ECONOMY

with this cost-cutting combination

There are two important reasons why thousands of metalworking plants are cutting costs with Firth Sterling mechanical toolholders, throw away inserts and engineering service. First, the broad experience and expert application knowledge of Firth Sterling engineers (yours at no cost) help you plan your tooling program for maximum savings. Second, in this complete line, Firth Sterling has toolholders and inserts—*exactly* right for *your* job:

THRIFTOOL—lowest cost toolholder made. Offers chipbreaker, rigid insert and rapid indexing for reduced set-up time.

ECONODEX—medium priced holder is ideal for jobs requiring positive rake. Carbide anvil and carbide chipbreak clamp assure long life.

MECHANIDEX—for heavy-duty machining. Adjustable chipbreaker offers extreme versatility, allowing top and bottom indexing of inserts.

FIRTHITE INSERTS—most precise dimensionally—are available in a full range of Carbide grades and the new Firthite Cermet WF Grade. *Now available for the first time, high speed steel throw away inserts in two of Firth Sterling's top cutting grades—Circle C and Van Chip.*

To get help with *your* tooling problem from a Firth Sterling engineer, simply call your nearest Firth Sterling sales office or distributor. And for further information on Firth Sterling toolholders and inserts, write for descriptive bulletin MTI-3: FIRTH STERLING, INC., Dept. 81-A, 3113 Forbes St., Pittsburgh 30, Pa. Offices and warehouses in principal cities.

"Your Future is Great in a Growing America"

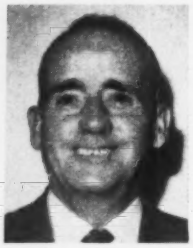
PRODUCTS OF *Firth Sterling* METALLURGY

HIGH SPEED STEELS • TOOL & DIE STEELS • STAINLESS SPECIALTIES • HIGH TEMPERATURE ALLOYS
SINTERED TUNGSTEN CARBIDES • HEAVY METAL • CERMETS • CHROMIUM CARBIDES
ZIRCONIUM • TITANIUM • STERVAC & STERCON SUPER ALLOYS

FIRTH STERLING TRADE MARK

Materials and Metallurgy

EDMUND M. VELTEN
Technical Director, Beryllium Corp.
Reading, Pa.



J. S. RODGERS
Technical Manager, New Products Div.
Wolverine Tube Div., Calumet
& Hecla Inc., Allen Park, Mich.

RALPH L. WILSON
Director of Metallurgy
Timken Roller Bearing Co.
Canton, Ohio

JOHN R. WILLARD
Manager, Sales Development Div.
Aluminum Co. of America
New Kensington, Pa.

biggest impact on industry in the next year or two. Now being evaluated in the automotive and electrical industries, it offers higher production rates and improved quality.

A substantial program of alloy development is in progress. Magnesium ZE10A, a sheet and plate alloy that does not require stress relief after welding, was recently put on the market. Scheduled for release in coming months are a new die-casting alloy for elevated-temperature applications, an aircraft sheet alloy with improved room temperature properties, and a sand-casting alloy with a good combination of room-temperature yield strength and elevated-temperature properties. Work continues on new families of alloys that will be compatible with each other and easier to fabricate. Initial costs also will be lowered.

Magnesium alloys with exceptionally high damping capacities will become important in the military electronics field. The first, K1A, is available in sand castings and diecastings; others will follow. High-damping alloys also have possible commercial applications, such as in reducing noise resulting from vibration in motor vehicles.

Results of Extrusion Tests On Beryllium Encouraging

—EDMUND M. VELTEN

• Because of its lightness, stiffness, and performance at elevated temperatures, beryllium is being seriously considered as an aircraft structural material. The relatively low ductility of the metal produced by present methods will somewhat restrict its utility until a more ductile type is developed.

In a number of aircraft applications, the material would be quite acceptable if it could be supplied in such standard metalworking forms as sheets, extrusions, and forgings. There is every reason to push the development of additional fabrication techniques independently of efforts to improve ductility.

The Air Force is sponsoring several research and development programs for the purpose of improving the properties of beryllium metal and evolving fabrication procedures. In addition to the beryllium producers, several airframe manufacturers, fabrication specialists, and research organizations are active in these programs.

Tubing with Ultrathin Wall Will Be Made in Many Alloys

—J. S. RODGERS

• Industry is quickly learning to use exotic metals such as zirconium, columbium, and molybdenum. Their nuclear properties and high temperature and corrosion resistance have made them essential to new developments in nuclear energy, missiles, and chemical and petrochemical processes. Work in the metallurgy of these materials has progressed and will continue to progress rapidly.

In the case of zirconium and the zircaloys, major fabrication difficulties have been solved. Tubing can be extruded to customers' orders in a wide range of diameters and wall thicknesses. Production rose steadily in 1958 and further increases in 1959 will lower prices. Seamless zircaloy tubing will then be more competitive with stainless steel and other corrosion-resistant materials.

Columbium has been successfully extruded and fabricated into tubes as thin as 0.500 × 0.030 in. in cross section. Next year, columbium seamless tubing will start winning a foothold for itself in industry.

It is also expected that substantial progress will be made in 1959 in fabrication methods for ductile vanadium and tantalum tubing.

Knowledge Is Key to Economy In High Temperature Steels

—RALPH L. WILSON

• As the use of steels for high temperature service grows in volume, greater discrimination will be given to the economical use of alloying elements.

With the accumulation of more data on high temperature properties, three fundamental mechanisms for increasing high temperature strength in steels are recognized (apart from simple solid solution effects): 1. Alloying to increase the temper resistance of martensite. 2. Alloying to produce secondary hardening. 3. Alloying to permit precipitation hardening.

Each of those mechanisms has a limiting temperature beyond which stable strength properties cannot be maintained for long periods. These temperatures are of the order of 600, 1100, and 1400° F for the respective classes of steels.

Aluminum Outlook Is Good, Packaging Shows Sharp Growth

—JOHN R. WILLARD

• Intensive and imaginative research and development, coupled with an integrated sales effort, leads us to believe that aluminum mill shipments in 1959 will run about 2 million tons, up 15 to 20 per cent from the 1958 level.

Building and construction will continue as one of the largest consuming markets, taking 485,000 tons. Its use in new residential construction spurted when National Homes Corp., Lafayette, Ind., announced three moderately priced homes utilizing from 1400 to 2000 lb per model.

The transportation industry should consume at least 370,000 tons. Aircraft and missiles should account for another 120,000 tons. Perhaps the most dramatic indication of aluminum's steadily increas-

Name your bearing needs...we'll meet 'em pronto from 30 types, 10,247 sizes

TIME and time again, machinery makers come to the Timken Company for help with some special bearing application problem. One they think hasn't been solved before. And time after time, from our 30 types and 10,247 sizes of Timken® tapered roller bearings, we've come up with the bearing design to do the job and at minimum cost.

It's no accident that we can help out so often. In sixty years of helping machinery builders with bearing problems, we've engineered and produced the world's largest selection of tapered roller bearings. And we've constantly improved our designs. The answers to thousands of bearing application problems are already in our files. Ready and available to help you.

And machine users get the same swift service if they ever need a replacement Timken bearing. Even for old machines, they can almost always count on immediate delivery of Timken bearings for replacement.

Why not call on our engineers for help whenever you have a bearing application problem or requirement? Timken is your No. 1 bearing value. Wherever wheels and shafts turn, Timken bearings eliminate friction, cutting wear and maintenance to a minimum. Specify bearings trade-marked "Timken" for the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

Materials and Metallurgy

J. H. JACKSON
Manager, Dept. of Metallurgy
Battelle Memorial Institute
Columbus, Ohio

KEMPTON H. ROLL
Executive Secretary, Metal Powder
Industries Federation, New York

MARTIN N. ORNITZ
Vice President—General Manager
National Alloy Div., Blaw-Knox Co.
Pittsburgh

ing role in production is the planned use of cast aluminum in automobile engines.

A continuing large market is consumer durable goods manufacturing. This segment is expected to take about 250,000 tons.

The electrical and communications industry is expected to consume about 200,000 tons. New developments in coil winding make it possible for the electric motor builders to use aluminum sheets and foil in place of copper wire and realize savings of up to 50 per cent in material costs as well as reduced winding costs.

Another 220,000 tons of aluminum is expected to go for the manufacture of nonelectrical machinery and equipment.

Containers and packaging, one of the sharpest growth areas, will consume more than 110,000 tons, principally in sheet and foil form. All other uses in 1959, including other defense applications, metal for steel deoxidizing, for alloying and miscellaneous other uses could amount to as much as 300,000 tons.

Metalworking Must Learn How To Use More Brittle Metals

—J. H. JACKSON

• Renewed interest is evident in the use of titanium in aircraft, missiles, and other military systems. The state of the art of producing and fabricating titanium is well along and it is just another metal in many shops today.

Molybdenum is an outstanding candidate among the refractory metals for use in military systems. Production of the metal increased last year. The most serious problem is its oxidation at high temperatures. Another major problem of molybdenum technology is the production of consistent quality in mill products.

Beryllium, as a potential structural metal in airborne equipment, has enjoyed a flurry of experimental interest. Its high modulus of elasticity in proportion to its weight, and its high melting point thermal conductivity and specific heat combined with its light weight make it potentially an excellent heat sink for airborne vehicles. Beryllium has been of interest in nuclear applications because of its low thermal neutron capture cross section. Development of more ductile material and improved welds are needed.

Columbium is a potential substitute for molybdenum in many applications. It has lower density and is somewhat easier to fabricate, has a lower melting point, but has better oxidation resistance. Research to develop columbium alloys with good high temperature properties and good oxidation resistance is underway.

Tungsten has an interesting combination of properties that make it one of the few potential materials for solving some of the problems where high temperature and high-heat flux are encountered in advanced weapons systems.

Steels of high strength levels are rapidly coming into use. We have seen the application as an aircraft structural material of a steel originally developed for hot forging dies. Steels of 300,000 psi ultimate tensile strength are coming in now and the ultimate development of steels of 400,000 psi is to be expected. There will be a general trend toward materials tailored for a specific end use.

We are going to have to learn to use more brittle materials through suitable design and handling techniques. Many of the newer materials will be difficult to machine and to form. They will be expensive.

Larger Presses, New Methods Coming in Powder Metallurgy

—KEMPTON H. ROLL

• Direct production of strip from metal powder will start in 1959. Large tonnage pilot operations were carried on successfully last year. Development work on economic production of copper tubing from powder is entering an advanced stage.

Size limits for powder metallurgy parts are disappearing. Reason: Larger presses and new techniques. This year may see 1958's record 30-in. diameter rings (for jets) and 235-lb bearings topped again.

One "exotic" method of forming metal powders may be used commercially this year in making these large parts. "Implosive compacting" subjects a large cylinder of metal powder to a directed explosive detonation. The result is a metal ingot having close to 100 per cent density. The high purity and precise control of composition of such ingots and parts are virtually impossible to achieve by conventional high temperature metallurgical methods.

Look for development of new mass production uses of powder metallurgy, probably hinged on special properties of the fabricated parts. One such possibility may be automotive brake linings where the unique controlled friction possibilities of powder metallurgy parts can come into play.

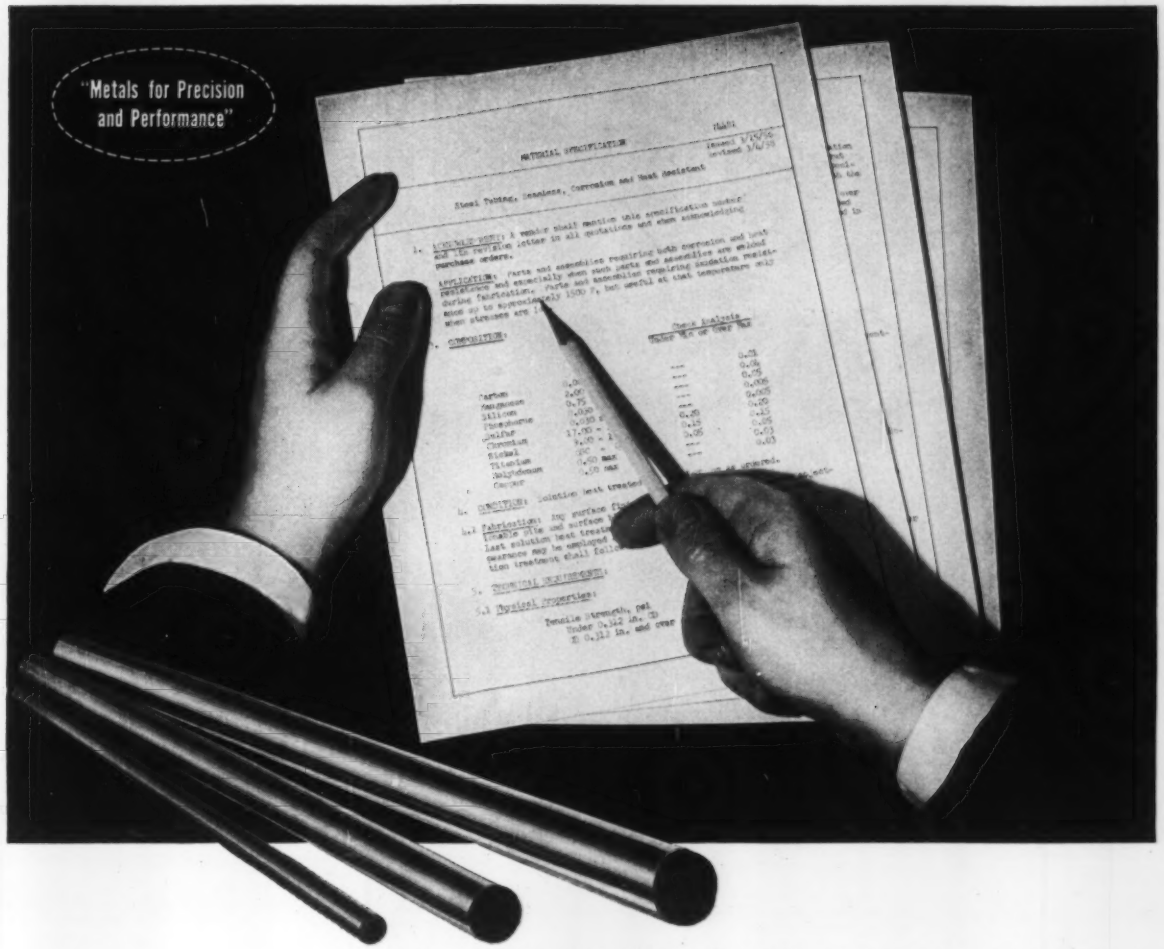
Watch, too, for basically new powders as starting materials. Already the H-iron and R-N processes are changing the complexion of powder materials. Higher alloy powders are also coming into use generally. New methods of protecting conventional iron powder parts are under development and show promise of vitally widening their use pattern.

New Heat Treat Techniques Demand Better Furnace Alloys

—MARTIN N. ORNITZ

• Recent developments in forming and new techniques in heat treatment are pushing the temperature ranges for heat treating above 2000° F.

Marked changes in the technology of furnace design and heat treating processes bring demands for alloys capable of performing for long periods at higher temperatures with the strength necessary to support the loads. They must have improved surface stability to withstand the chemical reaction of prepared atmospheres, corrosive conditions occurring from reactions of heat treating, and the



your individual tubing specs are a **BISHOP specialty**

That special tubing you need doesn't have to be a frustrating problem — BISHOP delights in tackling tough specs. BISHOP is uniquely equipped to handle specials—long on experience and capacity, short on delivery. You'll get help within 24 hours from a Quick Service Team of sales, metallurgical and production experts—and unexcelled quality tubing . . . the finest made.

Briefly, the Bishop Line . . .

STAINLESS STEEL TUBING Seamless, Welded & Drawn	Mechanical, Aircraft, Capillary, Hypodermic also NEW Stabilized and L grades, precipitation hardening alloys	0.008" to 1.000" OD 0.003" to 0.083" wall
NICKEL & NICKEL ALLOY TUBING	All standard grades	up to 1.000" OD 0.065" wall max
TUBULAR FABRICATED PARTS	Flanged, flared, milled, slotted, swaged, threaded	
GLASS-TO-METAL SEALING ALLOYS	Low expansion alloys for glass sealing applications	
CLAD METALS & COMPOSITE WIRES	Base metals & precious metals in various combinations	
PLATINUM GROUP METALS	Fabricated products—chemicals	
CATALOGS, DATA SHEETS ON THE ABOVE SENT PROMPTLY ON REQUEST		

Send in your individual specs for prompt handling, thorough analysis, prices, deliveries. Write, wire or phone Malvern 3100, or call your local steel service center.

Tubular Products Division

J. BISHOP & CO.

platinum works

MALVERN, PENNSYLVANIA

interchangeable with all standard JIC cylinders

With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1-½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures . . . and is also adaptable to the use of low pressure oil as the working medium. Write today to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

CHECK THESE 10 POINTS OF T-J SUPERIORITY

1. One Piece Piston
2. Hard Chrome Cylinder Bore and Piston Rods
3. High Tensile Steel Tie-Rods
4. Cushion Adjusting Screw, Externally Adjustable
5. New Super-Cushion for air, or Self-Aligning Master Seal for oil (T-J Patents)
6. Solid Steel Heads and Mounting Plates Standard all Models
7. Port Design Allows Minimum Pressure Drop on Inlet or Outlet
8. Chevron Type, Self-Adjusting Rod Packing
9. Piloted Packing Gland—Absolute Alignment
10. Piston Rod, Extra Strong—Polished and Chrome Plated for Efficiency and Protection

T-J TOMKINS-JOHNSON
RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHORS

Materials and Metallurgy

C. T. EVANS JR.
Vice President, Technology & Development, Universal-Cyclops Steel Corp., Bridgeville, Pa.

ability to transfer heat on a rapid scale.

The continued evolution and development of continuous annealing furnaces such as employed for tin plate, galvanizing, and silicon grades is another major trend requiring increased technology in the use and manufacture of high alloy castings.

Typical of the type of processes presently under development is the improvement in carburizing techniques by increasing temperatures from 1700 to 1900° F, for carburizing steel. Here, in addition to stress and load carrying capacity, is the need for resistance to carburization of the alloy.

Improvements and changes are occurring in the heat treating of stainless and continuous brazing applications, as well as that of sintering processes and techniques. All of these furnaces are going to temperatures in the range of 2000° F, and higher; and all will be used with controlled atmospheres or vacuum.

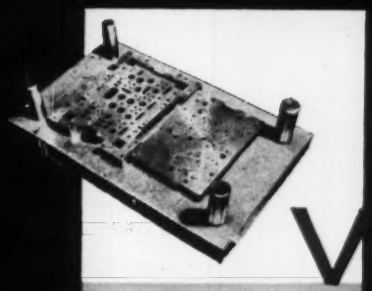
Emphasis in Vacuum Melting Is on High Temperature Uses

—C. T. EVANS JR.

• Progress in vacuum melting processes continues at a rapid pace. An increasing variety of alloys are being processed, with emphasis continuing on materials for high temperature applications.

The rapid progress of the missile industry has increased concentration on lower alloy grades which may not have to withstand more than 400 or 500° F in service. They would be useful for the first two stages of an ICBM. Ultrahigh temperature material is needed only in the third stage to take care of the reentry heating problem.

The most refractory materials available, such as molybdenum and tungsten, must be considered for the third stage of



veg

is a tough air-hardening tool and die steel that saves money and time by virtually eliminating the fitting and adjusting of dies after hardening. Its ability to resist distortion and size change is the most dependable in the industry. VEGA is the only steel that combines the machining properties of an oil-hardening grade with the safety in hardening normally found in air-hardening steels.

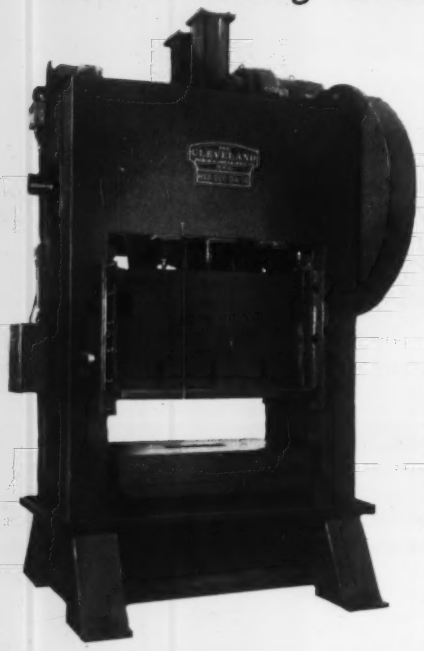
Prove it to yourself. Call your local Carpenter SERVICE-CENTER today for immediate delivery.

the *Carpenter* Steel Company, Reading, Pa.

For Greater Economy In Metalworking

CLEVELAND

Cost-Cutting PRESSES

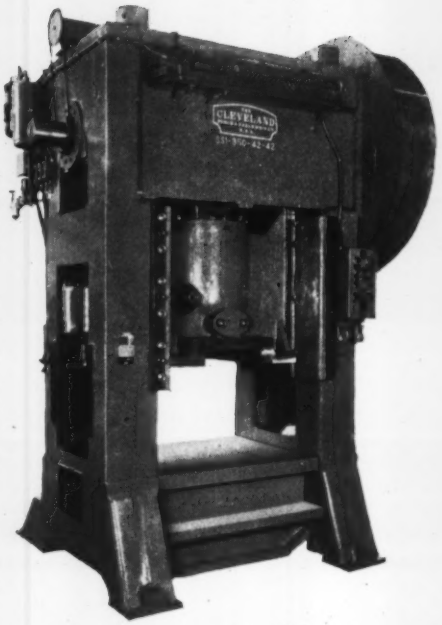


Cleveland high-speed Double Eccentric Press, 200-ton capacity, operates at 50 to 150 strokes per minute for high-speed punching, shearing, perforating, bending and forming.

Are production breakdowns, slow outmoded presses and mounting maintenance costs destroying your profits? A check of your press performance records may show you're already paying for new presses . . . *without their benefits.*

For lower operating costs, quicker starting, increased production, investigate the new minimum-maintenance Cleveland Presses. Our engineers are ready to help you plan a program of replacing old inefficient presses with modern cost-cutting Cleveland Presses of the exact type, size and capacity to meet your need.

You get better stampings for less with a Cleveland Press.



Cleveland's cost-cutting Single Eccentric Press, 350-ton capacity, operates at 60 strokes per minute, has air-counterbalanced slide and auxiliary air brake on flywheel.

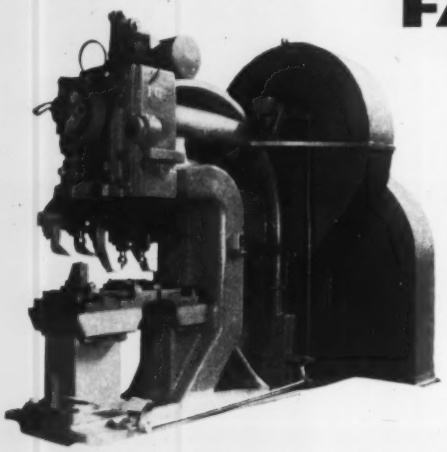
FABRICATING TOOLS

For Plate and Structural Steel

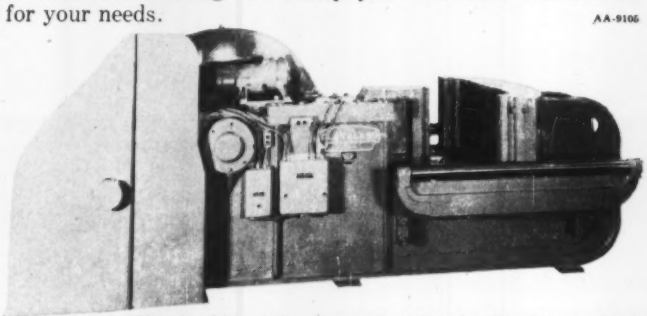
Ruggedly built for profitable production and simplicity of operation, Cleveland Fabricating Tools are designed for trouble-free operation and years of service—a fact proven by leading shipyards, bridge builders, railroads, structural shops and boiler makers since 1880.

For punching, coping, notching, shearing, bending and planing I-beams, steel plate, bars, angles and other structural shapes, you can do it better, more economically with Cleveland Fabricating Tools. Write for Catalog #9 to help you determine the correct tool for your needs.

AA-9106



Cleveland I G Beam Punching Machine equipped with 3 gaged punching attachments, one high and two low die holders, 24″ throat, completely enclosed gears and flywheel, punching capacity: standard 6″ to 24″ I-beams in flange and web. Other capacities and sizes available.



Cleveland No. 2 Bending & Straightening Machine, welded steel frame, completely enclosed gears and flywheel, arranged for direct-drive motor and equipped with power adjustment to plunger through separate motor. Capacity: bend or straighten 24″ I-beams vertically or horizontally.

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

Materials and Metallurgy

T. F. OLT
Vice President, Armco Steel Corp.
Middletown, Ohio

ICBM's and the requirement is creating new problems of supply in a wide variety of mill products. In an effort to solve some of those problems, the Navy and Universal-Cyclops are building In-Fab, which will permit the forging and rolling of refractory and reactive metals at temperatures as high as 3500° F in a protective atmosphere of argon.

It is expected that the facility will get its first tryout late this year. If it works, it will go a long way toward solving the most pressing problems facing the refractory metal industry.

Precipitation Hardening Steel Used in New Designs

—T. F. OLT

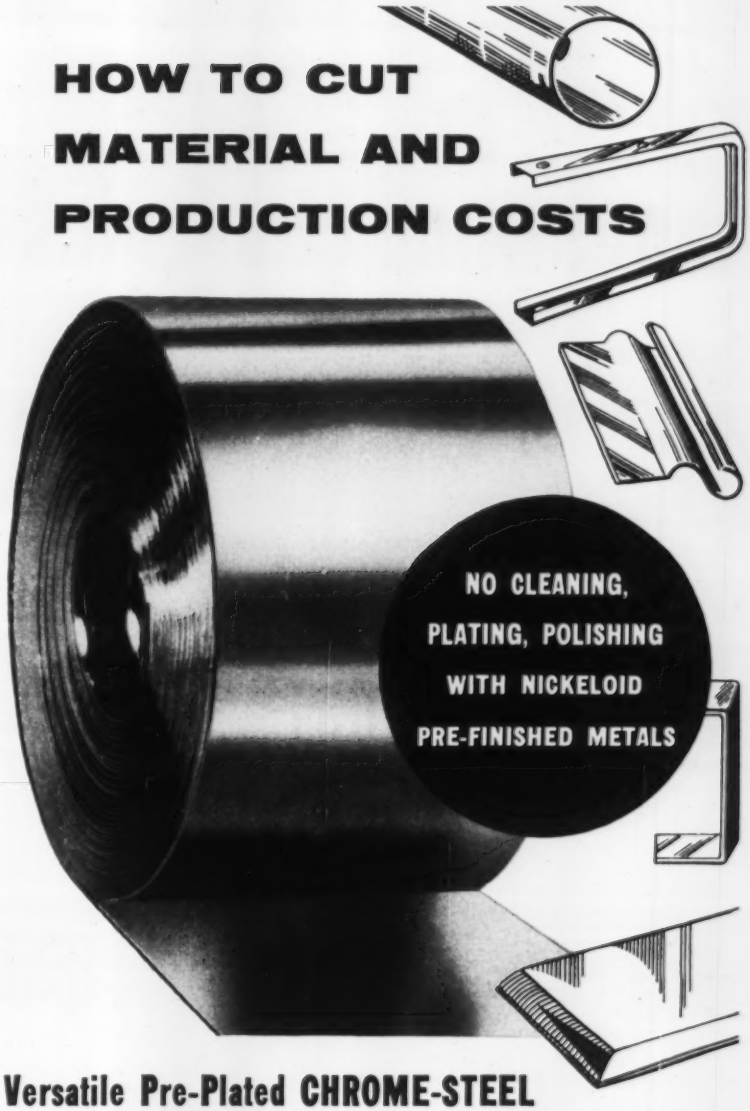
• In developing the steel-titanium airplane for 2000 to 2700 mph flight, changes in materials and basic design of airframe structures have been mandatory. To utilize the high strengths of the special steels, lightweight honeycomb panels have been developed.

During initial production of brazed steel honeycomb panels, costs were high. In 1958, with improvements in process and with more experience, several companies reduced costs sharply. Still newer techniques for faster production rates are in the development stage. It is likely that some of these new processes will come into production this year.

In the jet engine field, more use is being made of precipitation-hardening stainless steel forgings, castings, and formed sheets joined by welding or brazing. Considerations here, other than strength, include relative ease of machining the steels in a partially hardened condition after assembly. Distortion is minimized due to the low temperature of the final hardening operation.

In the missile field, 17-7 PH stainless

HOW TO CUT MATERIAL AND PRODUCTION COSTS



Versatile Pre-Plated CHROME-STEEL and NICKEL-STEEL Now Available in Three Grades

Cut costs! — Reduce production steps! The *need* was never greater; the *method* never surer than with Nickeloid chrome-steel and nickel-steel . . . now available in C-grade, *a new low-cost utility grade* for applications that don't require the quality of our A and B grades. These cost-cutting design materials are *pre-finished* — eliminate extra handling, cleaning, racking and polishing costs, plus actual plating costs. So versatile — adaptable to standard production methods, too! Their beautiful durable finishes can add so much in sales and utility value to your products at very low cost. Cut costs, reduce production steps with Nickeloid chrome-steel or nickel-steel — big 24″ wide coils, sheets, strips; bright and satin finishes. Now save even more with new low-cost C-grade!

NICKELOID METALS SINCE 1898 N·M

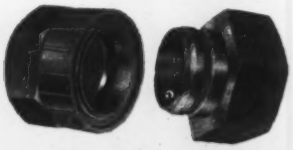
Write For More Information
AMERICAN NICKELOID COMPANY
PERU 1, ILLINOIS

MILLS — Peru, Illinois and Walnutport, Pennsylvania
Sales Offices Throughout the U.S.A.

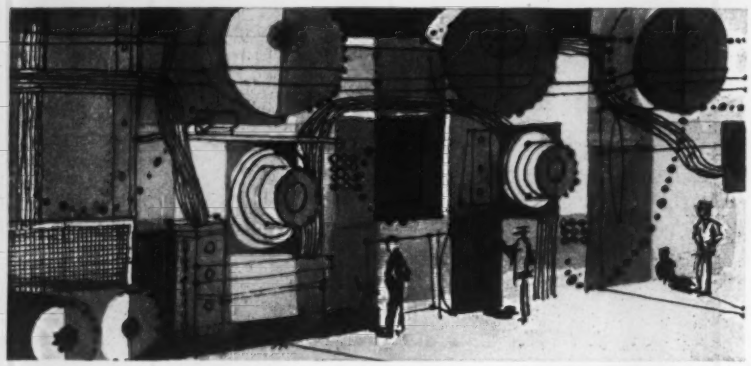
Roylyn

ALL PURPOSE

OPEN COUPLINGS



INDUSTRIAL COUPLINGS



COMPARE . . . TEST . . .
THEN USE THE BEST

- Quick Connecting
- Full Flow
- Ease of Operation
- Positive Lock
- Increased Efficiency
- Minimum Maintenance
- Maximum Efficiency
- Rugged Construction

. . . all adding up to "down-time" cut in half and production schedules met with half the effort.

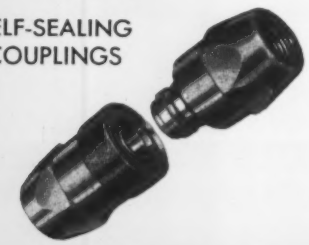
CUT "DOWN-TIME" IN HALF

SAVE...SAVE...SAVE

With every roll change . . . the nation's steel, tin, aluminum, paper and allied mills are saving up to 60 man-minutes with every roll change . . . a saving of thousands of dollars made possible with Roylyn Industrial Couplings!

Wherever hose connections are made, they can be connected or disconnected faster and easier with Roylyn "Quick" Couplings . . . FOLLOW THE LEADERS OF INDUSTRY FOR THE BEST CONNECTIONS IN THE WORLD!

SELF-SEALING COUPLINGS



The Best Connections in the World

DESIGNED • MARKETED BY AIRTERRA

620 PAULA AVENUE • GLENDALE 1, CALIFORNIA

Materials and Metallurgy

JOHN C. HAMAKER JR.
Manager, Research Dept.
Vanadium-Alloys Steel Co.
Latrobe, Pa.

steel has been useful for light, high pressure tanks for liquid propellents. With the emphasis on solid propellents, the requirement for corrosion resistant materials has been reduced and the lower alloyed, high strength steels are somewhat difficult to fabricate and heat treat with uniform results. Ease of fabrication and heat treatment of the precipitation hardening stainless steels may favor their use for solid propellent casings.

High Strength Steels May Often Replace Exotic Alloys

—JOHN C. HAMAKER JR.

• High strength and heat resistant materials are in an era of rapid development that foretells significant changes in the usage of various alloy types and analyses within the next few years.

Defense requirements for thermal barrier aircraft and missiles have accelerated material developments to provide new design potentials for engineers in many fields. Further shifts in material usage are arising from cost conscious re-examination of designs with an eye to replacing exotic materials and alloys with more conventional steels where they may be capable of furnishing equivalent service.

To take advantage of the ultrahigh strength properties available in the new materials, design and production engineers must become increasingly aware of the importance of eliminating stress raisers, good fabrication techniques, and careful heat treatment. With the lower yield strength structural materials employed in the past, localized yielding and deformation at stress raisers frequently corrected for errors in design or fabrication.

With high strength steels, those errors must be eliminated initially by improved techniques. When that has been done

ACHESON

dispersions digest

Reporting uses for

dag® BRAND DISPERSIONS

COLLOIDAL GRAPHITE, MOLY-SULFIDE, VERMICULITE, AND OTHER SOLIDS

WHY 'DAG' DISPERSIONS MEAN *PERFORMANCE* IN ALUMINUM EXTRUDING

The excellent lubricating properties of Acheson Colloidal Graphite, under conditions of extreme heat and pressure have been confirmed by leading extruders of aluminum, steel, copper, brass, lead and other metals. Water-base dispersions of colloidal graphite used in the following application histories have provided savings in material handling, reduced maintenance time and expense, prevented seizure, extended die life, and produced extrusions of more uniformly high quality. Any one of these benefits should make profitable reading for you.

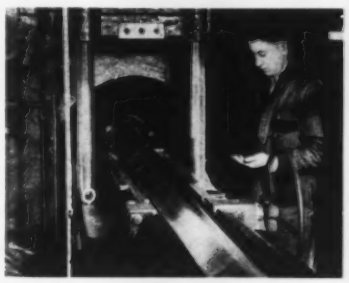
For faster, more uniform application with less material consumption, Aluminum Extrusions, Inc. finds 'Aquadag' their best die lubricant.

A little 'Aquadag' goes a long way for Aluminum Extrusions, Inc., Charlotte, Michigan. This company, one of the leading independent extruders in the country, has found that by applying 'Aquadag' on die surfaces they have effected a 30% savings in their material handling. Formerly, they had used an oil-graphite mixture which required a dilution ratio of 16 lbs. of graphite to a 55 gallon drum of oil. It was too slowly applied by swab and too coarse to apply by spray with any degree of efficiency.

With 'Aquadag', Aluminum Extrusions has a lubricant that is finer in particle size, permits wider coverage, and provides greater "sprayability". These minute particles pass freely through the spray nozzle, eliminating the costly downtime formerly involved in cleaning clogged equipment. The tough, dry film 'Aquadag' forms upon the evaporation of its water carrier, doesn't smoke or react when applied to hot dies and metals. This improves working conditions as well as extends die life. Important also to both die surfaces as well as the finished extrusion, is the fact that this durable, low-friction film allows easier, more uniform metal flow.

Considered in relation to the over 12 million pounds of aluminum extruded yearly at this plant . . . 85% of it in fabricated form . . . *'Aquadag' has brought important production efficiencies and material economy* to Aluminum Extrusions, Inc. In many, similar instances where product quality and basic economy are demanded, Acheson colloidal dispersions have gained ready acceptance.

Exclusive Acheson processing techniques guarantee a consistently uniform top-quality product. If your problem is more effective lubrication under normally adverse conditions of extreme temperature, pressures, or abrasion, call in your Acheson Service Engineer.



Extended die life and extrusions with more perfect surface finish, are attributed to the use of 'Aquadag'.

Dies last three times longer with 'Aquadag', according to another prominent midwest extruder. Metal pickup on the extruding dies has been completely eliminated by the use of this Acheson dispersion, extending the effective use of the dies from 1000 to 3000 strokes. The evaporation of its water-base leaves a dry, adherent "graphoid" film on all lubricated surfaces, inhibiting the build-up of abrasive precipitates. At the same time, the unbroken, microscopically-thin film that 'Aquadag' provides, facilitates metal flow and reduces scoring to a negligible minimum. Application of the lubricant is by spraying a dilution of 1 part 'Aquadag' to 20 parts water, on the die surface before each "push" of the extrusion press.

A 'dag' graphite coating is also applied to the follow blocks on this company's 1400 ton horizontal extrusion presses. For purposes of even greater economy, 'Prodag' — semi-colloidal graphite in water — is used in this application. This effective parting agent prevents the flash, back-extruded from the billet skin, from locking the butt to the follow block. An Acheson dispersion is very possibly the answer to your lubricating troubles. For additional information, write for your free copy of Bulletin 426. Address Dept. S-1.

ACHESON *Colloids Company*

PORT HURON, MICHIGAN

A division of Acheson Industries, Inc.

Also Acheson Industries (Europe) Ltd. and affiliates, London, England

Offices in: Boston • Chicago • Cleveland • Dayton • Detroit • Los Angeles • Milwaukee New York • Philadelphia • Pittsburgh • Rochester • St. Louis • Toronto

WIRE

BACKED BY A HALF CENTURY OF EXPERIENCE

- **Sizes up to 9/16"...**

. . . down to almost the size of a human hair, in low carbon and medium low carbon steels.

- **Wire of many finishes**

the right wire for the job—coppered, tinned, bright, galvanized and other finishes to fit your production needs.

- **Better forming and workability**

Continental Wire is available in almost any temper and analysis in low and medium low carbon steels for your particular forming jobs.

- **Metallurgical service**

Thousands of case histories provide unsurpassed resources for developing a practical solution to your wire problems.

ECONO-COIL—Reduces scrap loss up to 90 percent. Saves material handling time. The Econo-Coil gives you continuous length wire coils of 2000# to 3000# catchweight, in sizes from 12 gage through ½" diameter. Shipped on returnable Econo-Coil reels.

LEVERPAK—Mechanizes your wire handling, protects wire against moisture, dirt and handling damage. LEVERPAK permits long uninterrupted runs of 500# to 650#, depending on wire sizes. Saves scrap, downtime, stores easily.

SPECIAL SHAPES—D-shaped, V-shaped, oval, half-oval, half-round, square, rectangular, triangular, keystone-shaped and others. Saves fabricating and machining costs.

Chances are you have a problem right now that we can help you solve—with Wire. Call us.

CONTINENTAL

STEEL CORPORATION • KOKOMO, INDIANA

Wire Specialists for over Half a Century

PRODUCERS OF Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence, and other products.

Materials and Metallurgy

RICHARD E. PARET
Committee of Stainless Steel Producers, American Iron & Steel Institute, New York

in the structures produced so far, tremendous gains in weight, space, and material saving have been realized even in complex designs.

Stainless Is Important To Missile Technology

—RICHARD E. PARET

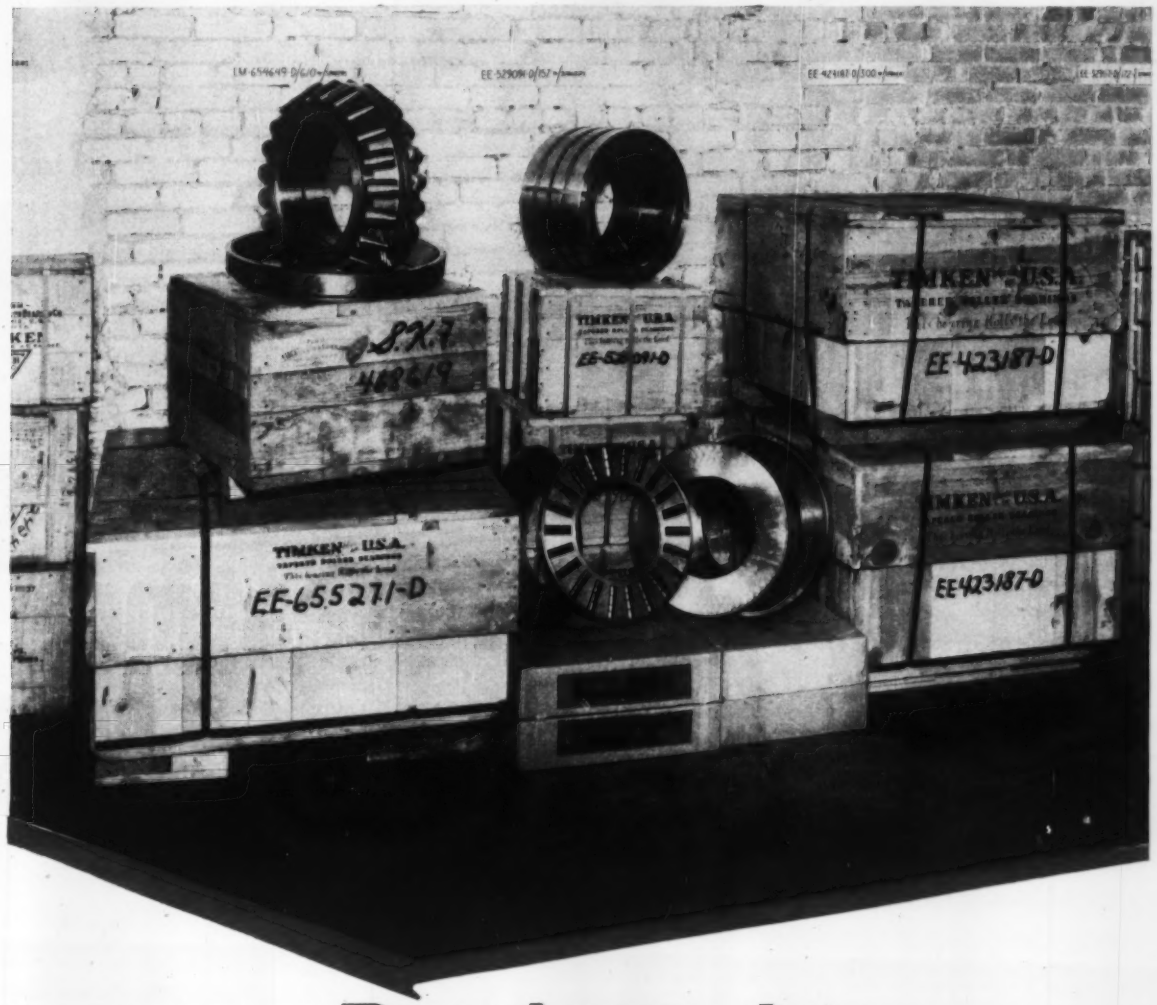
• New developments in stainless fabrication are being spurred by requirements for closer tolerance and higher strength-weight ratio components for aircraft and missiles. Breakthroughs have been made in the art of explosion-drawing steel parts in extreme depth.

Conventionally formed extrusions are generally of closer tolerance due to improvements in die and lubrication technology. More complex shapes are being produced, and multiorifice dies are increasing output for some extruders. The development of flat container extrusion of stainless holds promise for the production of wide, integrally stiffened skins and other complex shapes.

Flexible die forming methods are being further developed for stainless component fabrication. No-draft forgings of complex configurations are being made on the large Air Force presses for the newest generation of military and aircraft vehicles. A wider use of spin forming is also evident.

Welding of stainless is further being stimulated by increasingly stringent requirements in aircraft, missiles, and atomic energy. Almost all the Atlas airframe is thin-walled stainless steel, finely welded section over section.

The largest market for stainless continues to be the automotive industry. Functional brightwork and ornamental wheel covers are dominantly stainless. The alloy is a strong contender for front and rear bumpers.



In stock at Bearings, Inc.
. . . steel mill work roll, back-up roll, roll neck bearings ready to ship!

If you know bearing numbers—a check of those in the photograph will tell you they are among the largest and most expensive precision, steel mill bearings made. These and many other steel mill bearings, large and small, are ready in Bearings, Inc. stock for immediate delivery!

Why carry heavy inventories of these expensive bearings? Our large stocks for replacement "on the mill" or "off the mill"—bearings for all types of mill tables, coils, cranes and mill motors as well as ingot car bearings and pallet wheels can be ordered and delivered immediately!

No other bearing distributor carries a comparable stock of steel mill bearings ready for every emergency. If you want steel mill bearings in a hurry, call or write NOW!

Shown in the photograph are only a few of the many steel mill bearings in stock. Left, a SKF Back-up Roll Thrust Bearing sits on a 2,000 lb. Timken Back-up Roll Bearing. Center, Timken Work Roll Bearings and Rollway Self-Aligning Thrust Bearings. Right, in boxes, are a pair of matched Timken Back-up Roll Bearings.

Providing bearing service in the North ➤

BEARINGS, INC.

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo, Balanrol Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and

in the South ➤

DIXIE BEARINGS, INC.

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville

P. C. OSTERMAN
President, American Gas Furnace Co., Elizabeth, N. J.

CARY H. STEVENSON
Vice President, Lindberg Engineering Co., Chicago

L. B. ROSSEAU
President, Ajax Electric Co. Philadelphia

A. F. HOLDEN
President, A. F. Holden Co. Detroit

1959 FORUM ON TECHNICAL PROGRESS

Heat Treating

Production Cutbacks Promote Trend to Smaller Furnaces

—P. C. OSTERMAN

• In the heat treatment industry, greater care will be exercised in the selection of equipment in the years ahead as effects of the recent slowdown are analyzed in the light of over-all costs.

Those concerns who were equipped with furnace equipment most versatile and more easily adapted to various processes suffered the least from the shrinking of the economy. Extremely large and highly specialized equipment must have continued production to pay for its use and upkeep.

With continued production, large single units are the least expensive to run and may represent the least initial investment, but when reduced production is necessary they become uneconomical. Therefore, the trend will be to spread production, when feasible, over smaller units.

With the increasing accent on missiles in our defense program, the large number of government cost-plus contracts for other items, many of which require heat treatment, will also diminish, making it mandatory to select equipment which will assure a continuing profit in a competitive market.

Increased demand for stainless steel fasteners in the automotive field, as well as in many appliances, has encouraged our industry also to devise better ways of handling that product. The progressive equipment means of handling and better results will be reflected in the regular line of equipment also.

Rapid Missile Development Has Revitalized Technology

—CARY H. STEVENSON

• The great strides in missile development will bring new revitalizing materials, methods, and equipment to the rest of U. S. industry.

New ultrastrength steels, including air hardening, martensitic, and vacuum melted types, are developing tensile strengths unheard of until recently. Vacuum heat treating, atmosphere heating, and quenching of large structures, brazing of honeycomb and other fabricated designs, all have applications in many fields. New superrefractories make some of those methods possible.

The pressure of defense needs provided incentive and funds to complete development ordinarily requiring much longer.

The slackening of production particularly in the capital goods field may also be viewed as an important factor in the astonishing progress in many technical fields during 1958. And the "soaring sixties" may well belong to those who first realize the richness of those developments.

Gas Fired Salt Bath Furnace With Internal Heating Coming

—L. B. ROSSEAU

• Refinements in salt bath equipment have brought about better quality of product through closer control of temperatures, better surface protection, reduced distortion, easier maintenance and longer life of the furnace, and more complete mechanization.

The outlook is improved by two new factors.

The first is favorable evidence of the ease and economy of extending liquid carburizing procedures to the higher operating temperatures being considered by industry.

The second is the perfecting of a gas fired, salt bath furnace which has internal heating. Such equipment has been limited to the electrode type furnace for all operating temperatures above 1200° F, including those required for forging purposes at 2300° F and up.

Instantaneous Heat System Proved, Has High Potential

—A. F. HOLDEN

• Instantaneous heat, or the Luminous Wall system, will gain wider acceptance in 1959.

Test data for ceramic coatings on metal

JAMES R. COLEY
Secretary & Sales Manager
Ajax Electrothermic Corp.
Trenton, N. J.

K. U. JENKS
President, Metal Treating Institute
Lindberg Steel Treating Co.
Melrose Park, Ill.

R. L. HARPER
Executive Vice President
Harper Electric Furnace Corp.
Buffalo

ELTON E. STAPLES
Vice President, Hevi-Duty
Electric Co., Milwaukee

prove that this gas system of combustion is equal to electricity in temperature uniformity. The combustion does not affect the ceramic type paints for such metals, nor does it affect the luster for weatherability requirements.

The method is being used in the aluminum industry for melting. Aluminum components of auto air conditioning units are being brazed in a Luminous Wall furnace and it has been used to thaw ore and coal cars.

Proof tests on snow removal from ramps and airports to facilitate loading and unloading will be made this month.

Automation of salt bath treatment has come into use during the last two years. You can expect to see more such installations this year.

Static Device Will Fill Gap In Induction Heating Field

—JAMES R. COLEY

• The recent development of low cost, static equipment, we feel, will speed wider acceptance of induction heating by the metals industry. Such equipment will fill the gap between line frequency and the higher frequencies available with conventional motor-generators.

The new concept of frequency conversion has the simplicity and dependability of a transformer. On the larger heating jobs, the static unit will do the job of a motor-generator. It may also be used as a power source in combination with a motor-generator in dual-frequency heating applications. Used with conventional motor-generators, it can provide higher frequencies for many heating applications with no major reduction in efficiency.

It is adaptable for melting chips, borings, and turnings because it stirs or agitates the molten bath. In vacuum melting, the increased stirring effect will permit more rapid outgassing of the molten metal. Large induction vacuum furnaces in the capacity range of 5 to 10 tons will not require additional line frequency equipment to stir the molten bath.

Continued developments toward low initial cost and efficient equipment will have a tendency to break the price barrier and improve capital equipment purchases in our industry.

Space Age Hardware Requires Special Heat Treat Methods

—K. U. JENKS

• The Space Age has brought new challenges to the commercial heat treater. Although quantities of hardware to be heat treated are relatively small, the dimensional characteristics involved necessitate development of special heat treating techniques and the installation of huge new facilities.

Methods and processes hitherto employed only to a limited extent are being perfected. Temperatures will be controlled by automatic electronic instruments coupled with magnetic amplifiers and saturable core reactors. Atmospheres will be controlled by dual recording-controller units which will automatically sample the atmosphere in the furnace and signal valve adjustments to maintain desired carbon potential.

We believe such improvements will soon be in common use by the commercial heat treater on both civilian and military work.

Builder Cites the Need for Engineering Study Contracts

—R. L. HARPER

• We foresee a rapidly increasing demand for higher temperature technology and for more automation in industrial heating equipment.

The requirements of high temperature research (300 to 6000° F) will continue to force furnace builders to be one jump ahead of research people.

Science is searching for high temperature materials that will stand up in an oxidizing atmosphere. Our continuing problem will be to find materials for constructing environmental chambers which will withstand the temperatures for testing tomorrow's specimens.

Automation is becoming more vital as manufacturers seek relief from the ever-mounting squeeze between labor costs and resistance to price increases. We are not referring merely to automatic heating equipment, but to automated production lines into which the heating equipment is fully integrated.

To meet growing demands for both high temperature and automation, industrial heating equipment manufacturers like ourselves will find that we must become specialists in certain areas where we are qualified to offer top caliber engineering service.

In an increasing number of cases, this specialization should lead to engineering study contracts instead of competitive bids on advance design equipment. We cannot afford to put advance engineering into highly specialized furnace bids on a speculative basis. It is becoming more and more apparent that buyers get the best designs with engineering study contracts.

Trend to Automatic Units For Heat Treating Continues

—ELTON E. STAPLES

• In the immediate future, several developments can be expected, most of them continuations of a long term trend. Search is continuing for higher strength, high temperature alloys and refractory metals. These require higher temperature furnace equipment for production, fabrication, and testing techniques. Large continuous furnaces are being built to handle 1000 lb or greater loads at 3500° F.

There is a continuing shift to auto-

Heat Treating

DONALD E. MOAT
Vice President—Marketing
Leeds & Northrup Co.
Philadelphia

H. M. HEYN
President, Surface Combustion
Corp., Toledo, Ohio

VINCENT R. TROGLIONE
Vice President & General Manager
Sunbeam Equipment Corp.
Meadville, Pa.

IRVING DICKTER
Chief Metallurgist, Meta-Dynamics
Div., Cincinnati Milling Machine Co.
Cincinnati

matic heat treating units to harden, quench, wash, and temper without need for operator attention. Speeding the work through the plant by automation is also applied to high temperature carburizing equipment which permits heavier case carburizing at 1800 to 1900° F followed by slow cool, or by cool and quench.

In the automotive field, use of aluminum alloys is being accelerated. These alloys require melting and heat treating equipment of large capacities. There is also a continuing increase in the use of aluminum extrusions for transportation equipment, architectural applications, and furniture. The continuous casting of aluminum billets or extrusion slugs is common and increasing. Large capacity aluminum melting, homogenizing, and billet heating equipment are being used in this field.

A greater quantity of aluminum will go to the container field for food products, beverages, and spray bombs. The automatic casting of aluminum slugs for impact extrusion of these containers represents a great saving over production of slugs by other means and makes the wide use of these containers economically feasible.

More Use of Static Devices Seen in Heat Treat Control

—DONALD E. MOAT

• With the management of metalworking plants striving to find new ways of reducing processing costs, of developing new methods, new metals, and new alloys, the role of instrumentation is becoming increasingly significant.

Already, many heat treat processes are operating at higher temperatures. Precise control of those temperatures becomes critical, both to product and equipment. To perform its task, instrumentation must be thoroughly reliable, accurate, and flexible.

Current trends in metalworking instrumentation include:

1. Greater use of control devices and components having no moving parts, such as saturable core reactors and magnetic amplifiers, and transistors.
2. Standardizing on primary elements to simplify the stocking of replacement parts and improve servicing efficiency.
3. The use of more accurate, more compact controllers and recorders, often with auxiliary devices for centralizing data about an entire heat treating process, or group of processes.
4. A wider use of atmosphere control to protect the work, eliminate rejects and spoilage, and handle difficult heat treat jobs on a reproducible basis.

More Heat Treaters Buying Completely Assembled Units

—VINCENT R. TROGLIONE

• In this era of increasingly greater competition, every progressive metalworking company is on the lookout for new ways to cut costs. This has become apparent to us in two ways: The trend toward providing our customers with completely assembled and tested furnace equipment at the time of delivery to the installation site, and a keen interest in new product developments.

To better serve our customers, we recently purchased the production facilities of the Industrial Heating Div. of Westinghouse Electric Corp. and have moved our operations from Chicago to Meadville, Pa.

A major share of furnace equipment we supply to industries today has been tested and assembled by the time it reaches the customer's plant.

The greater interest in new furnace developments has been made evident to us by the increase in inquiries on products displayed at trade shows and in advertisements. This, we believe, is merely a reflection of management's belief that to stay on top a company must be acutely aware of every possibility for applying new processing methods.

Heat Treat Research Needed To Meet New Requirements

—H. M. HEYN

• Government and industry will have to combine their efforts to guarantee stability so that the metal industry can be kept healthy and flexible in the military and economic cold war.

We must produce more and better things from the ingot to the finished product. To us, this means that we will have to meet all requirements of the metal industry and keep in step with all metallurgical and process improvements.

Research and development will be important, leading to more time saving devices for completely automated lines as well as for individual mechanized batch type units. The same applies to improved quality control methods, higher purity atmospheres, and furnaces to meet higher temperature requirements.

The increasing demand for light metals and their application has already resulted in the design of new and improved furnace lines for aluminum, copper, and brass production.

Much obsolete heating and heat treat equipment in use must be replaced. With labor cost constantly increasing, management is expected to take a close look at appropriations early this year.

Rotary Burners May Solve Problems in Flame Heating

—IRVING DICKTER

• Those of us who are interested in flame heating are extremely conscious of oxygen costs, since each decrease in oxygen price increases the number of applications which can be economically

HANDY ALLOY DATA SHEET

HANDY & HARMAN
ENGINEERING DEPARTMENT
82 FULTON STREET, NEW YORK 38, N. Y.

ALLOY LIST

Handy & Harman Silver Brazing Alloys

...The COMPLETE line that meets all specifications and production needs

Need to join any combinations of metals—ferrous and nonferrous? Investigate the vast number of products, assemblies and parts that are being joined better by silver brazing alloys. Handy & Harman, the Number One Source of, and Authority On Brazing Alloys and Methods makes—and makes readily available—the following silver brazing alloys:

HANDY & HARMAN SILVER BRAZING ALLOYS

NAME		SILVER	COPPER	ZINC	OTHER	MELTING POINT °F	FLOW POINT °F	TROY OUNCES PER CU. IN.
EASY-FLO		50%	15½%	16½%	(18% Cd.)	1160	1175	5.00
EASY FLO #3		50	15½	15½	(16% Cd. 3% Ni.)	1170	1270	5.00
EASY-FLO 45		45	15	16	(24% Cd.)	1125	1145	4.92
EASY-FLO 35		35	26	21	(18% Cd.)	1125	1295	4.90
SIL-FOS		15	80	—	(5% P.)	1185	1300	4.45
SIL-FOS 5		5	88.75	—	(6.25% P.)	1185	1300	4.37
NEW NAME	**FORMER NAME**	**SILVER**	**COPPER**	**ZINC**		**MELTING POINT °F**	**FLOW POINT °F**	**TROY OUNCES PER CU. IN.**
BRAZE TEC*	TEC*	5	—	—	(95% Cd.)	640	740	4.60
" 056*	TEC-Z*	5	—	16.6	(78.4% Cd.)	480	600	4.53
" 071	SN #7	7	85	—	(8% Sn.)	1225	1805	4.82
" TL	TL	9	53	38		1410	1565	4.50
" 202	AT SPECIAL	20	45	35		1315	1500	4.68
" ATT	ATT	20	45	30	(5% Cd.)	1140	1500	4.64
" NE	NE	25	52½	22½		1250	1575	4.71
" 251	AE	25	57.5	17.5		1255	1625	4.68
" SS	SS	40	30	28	(2% Ni.)	1220	1435	4.76
" 404	SS-5	40	30	25	(5% Ni.)	1220	1580	4.72
" DT	DT	40	36	24		1235	1415	4.80
" DE	DE	45	30	25		1230	1370	4.82
" ETX	ETX	50	34	16		1250	1425	4.99
" 541	ALLOY-4772	54	40	5	(1% Ni.)	1340	1575	5.06
" 560	ER	56	22	17	(5% Sn.)	1145	1205	5.00
" 580	EB	57.5	32.5	—	(3% Mn.- 7% Sn.)	1120	1345	5.05
" RT	RT	60	25	15		1245	1325	5.02
" 603	RT-SN	60	30	—	(10% Sn.)	1115	1325	5.23
" 630	RSNI	63	28.5	—	(6% Sn.- 2.5% Ni.)	1275	1475	5.12
" EASY	EASY	65	20	15		1235	1325	5.06
" MEDIUM	MEDIUM	70	20	10		1275	1360	5.14
" BT	BT	72	28	—		1435	1435	5.24
" HARD	HARD	75	22	3		1365	1450	5.28
" 752	TR #1	75	—	25		1300	1330	5.06
" IT	IT	80	16	4		1345	1490	5.29
" 852	85 Ag.-15 Mn.	85	—	—	(15% Mn.)	1760	1780	5.08

*A Solder—Not a Brazing Alloy

Space does not permit listing the many special alloys, formulated for a particular or unique application. Handy & Harman Brazing Engineers and Technical Service are always ready to work closely with you on metal-joining problems and methods.

Comprehensive technical literature covering all aspects of brazing methods and alloys awaits your request.

GET THE FACTS FROM BULLETIN 20

This informative booklet gives a good picture of silver brazing and its benefits...includes details on alloys, heating methods, joint design and production techniques. Write for your copy.

Your NO. 1 Source of Supply and Authority on Brazing Alloys

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES AND PLANTS
ATLANTA, GA.
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CALIF.
OAKLAND, CALIF.
TORONTO, CANADA
MONTREAL, CANADA

THE MARK OF QUALITY

BARBER COLMAN

Wheelco Instruments

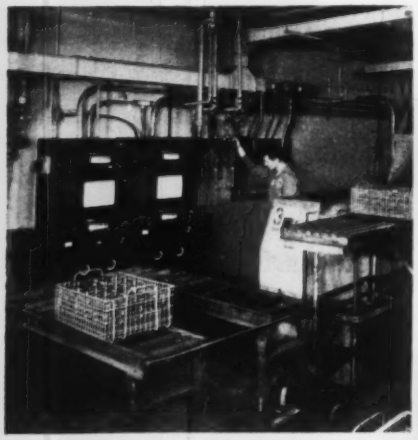
Now, Wheelco the leader offers 3-function control forms with low-cost 400 Series controllers

Proportioning with automatic rate and reset makes Wheelco stepless, electric proportioning control better than ever.

Outstanding accuracy and unmatched economy have been combined in Series 407 millivoltmeter controllers by the undisputed leader in supplying stepless electric proportioning control. Instrument users benefit from advanced designs backed by thousands of successful installations. Wheelco not only gives you 3-function controllers, but for stepless electric proportioning control your systems can incorporate:

1. **CURRENT LIMITERS** for added protection on molybdenum-wound or platinum resistance elements.
2. **ANTICIPATORY ACTION** to give fast warm-up without temperature overshoot.
3. **NEW PILOT AMPLIFIERS** with more efficient components and biasing circuitry for improved linearity.

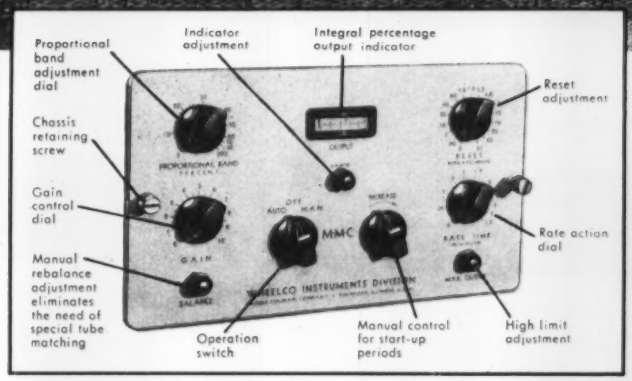
Let your nearby Wheelco engineer help in the solution of your control problems. He is as close as your telephone. You can expect more when you specify Wheelco and be sure you get it.



Heat-treat department uses 12 saturable reactors to handle various types of furnaces, gets better work quality, lower power costs.

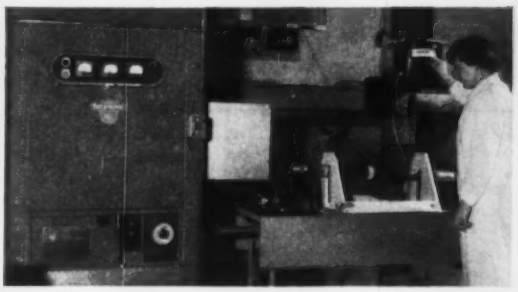
Ease of replacement of components proves of added value on battery of creep test furnaces as chassis can be replaced even during test.

Transistor cells are assembled on tinned tabs and go through this 12-zone furnace where temperature control must be ultra-precise.



The 3-function controller for automatic rate, reset and proportioning action on a millivoltmeter-type controller is a Wheelco exclusive. It provides outstanding process control accuracy at minimum cost.

Harsh thermal shocks must be avoided in this induction heating setup for growth of germanium semi-conductor crystals. Growth is in Vycor tube with heating coil on outside and carbon ring holding thermo-couple inside.



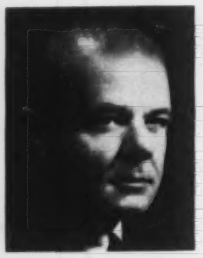
BARBER-COLMAN COMPANY

Dept. M, 1396 Rock Street, Rockford, Illinois, U.S.A.

BARBER-COLMAN of CANADA, Ltd., Dept. M, Toronto — EXPORT AGENT – AD. AURIEMA, INC., NEW YORK

Industrial Instruments • Automatic Controls • Air Distribution Products • Aircraft Controls • Small Motors
Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

Heat Treating



ROBERT B. HANNA
General Manager, Industrial Heating Dept., General Electric Co.
Shelbyville, Ind.

ROBERT E. FLEMING
Executive Vice President
Industrial Heating Equipment Assn.
Washington

JOHN A. LOGAN
President, Magnethermic Corp.
Youngstown

processed by flame heating methods.

Oxygen producing installations in the plants of large users are increasing. It is our hope that expanded activity will eventually result in lower oxygen costs for the small and medium quantity users.

Because of the emphasis placed on missiles and rockets, we note the ever increasing activities in flame research, rocket burners, and plasmajet burners.

The steady progress reported in those fields causes one to wonder how soon it will be before those enormous heat sources can be controlled for flame hardening applications.

Interest in automatic equipment for flame hardening continues high. Improvements in some of the auxiliary equipment is of benefit to current applications and opens the way for new flame heating uses.

The development and availability of a rotary burner is an answer to a long felt need in flame heating burners. Some thin walled parts when heated internally may collapse when held externally while being rotated. A change to an internal rotating burner would prevent that from happening. Odd shaped parts which are difficult to position are much more easily handled by using a rotating burner.

Some external work, like localized heating on the end of a shaft, might be better accomplished by rotating a U-shaped burner rather than the whole shaft. Rotating mechanisms, such as this, find a number of uses where localized areas are to be heated on a number of different parts. Such flame burners would be a lot simpler to make and would be applicable to a greater number of parts than if the part were rotated.

Furnace Improvements Promote New Heat Treating Techniques

—ROBERT B. HANNA

• The demand for higher temperatures, especially from the aircraft and missile industry, continues. We are designing equipment to operate at 4000° F in vacuum.

A major development in 1958 was the muffleless electric furnace for bright annealing or brazing of stainless steel. A new type refractory lining does not contaminate the hydrogen, so the muffle is not needed. This eliminates an expensive maintenance problem and greatly decreases downtime, and it permits building such furnaces for higher temperatures.

Continuous annealing of metal strip has been improved with high speed cooling—impinging jets of air or protective atmosphere. The unitized coolers are designed for easy adaptation to various types of continuous strip heat treating equipment.

Furnaces, utilizing metallic retorts, have been built to permit treating materials with air or gas pressures ranging from 1 micron to 15 psi and temperatures up to 2150° F. Such equipment provides a new tool for brazing, sintering, degassing, and other heat treatments which were not possible previously.

The cold wall, or radiation shield vacuum furnace, has been made more adaptable by incorporating means of introducing and circulating hydrogen, argon, or helium to accelerate cooling of the charge.

Progress has also been made in the continuous annealing and oxide blueing of magnetic steel laminations for motors and transformers. Fully automatic roller hearth furnaces have been developed to carry out the entire operation.

Unusually large furnaces are being developed for the high temperature brazing of stainless steel honeycomb structures for high speed aircraft. They are arranged for rapid cooling of the charge after heating.

Heating Equipment Exports Will Exceed High 1958 Level

—ROBERT E. FLEMING

• Manufacturers affiliated with the Industrial Heating Equipment Association are virtually unanimous in their expectations that 1959 will be the initial year in a general market expansion for industrial heating equipment. A recent survey of top management opinion in the industry reveals that during 1959 new business will increase about 20 per cent over that of last year.

It is expected that exports of furnaces, ovens, induction and combustion equipment will exceed the high foreign demand attained in 1958 when it rose 18.5 per cent above the preceding year.

The great efforts of our industry in research and development are responsible for the expected expansion in business activity. Remarkable progress has been made in the design and operation of vacuum heating equipment, high purity atmosphere generators, salt bath processes, low and high frequency induction heaters, precision quenching units, and combustion devices.

Great strides are anticipated in the field of automation for continuous processing to insure low cost, high quality production. Moreover, the industrial heating equipment requirements of the Space Age will undoubtedly spur a variety of related developments.

The major departure in 1959, as we see it, will be a significantly greater reliance by industry in general on knowhow of industrial heating equipment manufacturers. More firms will obtain the benefits of the technical ability of the heating equipment manufacturers by inviting an investigative approach to insure optimum results with greater safety and economy.

Induction Heating Expanding In Forging, Extrusion Areas

—JOHN A. LOGAN

• It now appears that business conditions of the last 12 months may have been a boon to the induction heating industry. With greatly relieved pressures on immediate production, management and engineering groups have been able to more thoroughly investigate methods for cost reduction and product improvement.

The next 12 months should see some solid growth in the industry. Applications

PEOPLE & U.S. ENGINEERING & RESEARCH

Key Dwight-Lloyd® personnel, at left, photographed in the Lab. *Counterclockwise from left:*

ROBERT C. McDOWELL, *President*, McDowell Company

PATRICK V. GALLAGHER, *Vice President*, McDowell Company

THOMAS E. BAN, *Director of Research*, McDowell Company

CHARLES D. THOMPSON, *Assistant to the Director of Research*

CHARLES A. CZAKO, *Research Metallurgist*

HAROLD E. ROWEN, *General Manager*, Dwight-Lloyd Division

ALLEN R. ROWEN, *Chief Project Engineer*, Dwight-Lloyd Division

experience explains Dwight-Lloyd® leadership in continuous sintering

SERVING a world-wide clientele in a multitude of ferrous and non-ferrous applications, Dwight-Lloyd continuous sintering is the bonanza of today's minerals processing. Our thoroughly American engineering approach delivers custom-tailored pyrometallurgical plants distinguished by the McDowell-developed Flying Saucer®, a superior mixing disc, and our ABCs® Belt Scale.

Conclusive pilot plant work at our famous Dwight-Lloyd Research Laboratories, also founded by the inventors of the continuous sintering process, adds reputation and confidence to Dwight-Lloyd — *the granddaddy of them all and still the best.*

SINTERING AT DWIGHT-LLOYD® DIVISION

McDOWELL COMPANY, INC., CLEVELAND 10, OHIO, U.S.A.

The McDowell Family of Related Enterprises—*McDowell Turnkey Plants • Dwight-Lloyd Research Laboratories Wellman Bulk Materials Handling Systems and Steelmaking Machinery • Anker-Holth Power Cylinders Dwight-Lloyd Ore Beneficiating Plants • ABCs Belt Conveyor Scales • Williams Buckets • Wellman Locomotive Cranes*

AUTOMATED!

ALUMINUM INGOT HEAT TREATING

Here's how one of the nation's leading producers of aluminum has met their increased production demands . . . with a high volume Holcroft in-line automated furnace.

Their problem was to heat 30,000 pounds of aluminum ingots per hour for rolling into sheet. To provide the efficiency required to meet this production schedule, Holcroft designed a continuous furnace incorporating automatic discharge and transfer of the hot 6,000 pound ingots onto the mill roll table (as shown). The design did not stop here, however . . . 24 hour a day, 7 day a week operation was not required. So, to utilize off-peak production periods, when the break-down mill wasn't operating, the furnace was designed for *double* duty . . . as a batch-type unit for homogenizing special alloy ingots. And you can't top that for efficiency!

Yes, the swing to aluminum will call for more automation, plus more and larger continuous heat treat equipment. And for this, *call Holcroft* . . . where many years experience in aluminum heat treating are combined with unmatched "know how" in the field of automated heat treat equipment. Let this combination automate your aluminum heat treating . . . call Holcroft today!

HOLCROFT & COMPANY

6345 EPWORTH BOULEVARD
DETROIT 10, MICHIGAN
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • HARTFORD, CONN. • HOUSTON, TEXAS • PHILA., PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario.

Heat Treating

W. A. DARRAH
Vice President, Continental Div., Lindberg Industrial Corp. Chicago

now proving in one or two installations will be fully accepted and well underway toward general use.

In forging, studies have proved that equipment and fuel costs can be a small portion of total operating costs. The trend is toward more economical and highly productive press forging, and automatic tong feed machines. Here induction heating will provide needed scalefree, rapidly heated billets, at regularly timed intervals. Many large billet, high tonnage operations in steel extruding, forging, rolling, and drawing will go to induction heating, with several installations now operating and proving practicability and definite advantages.

In the next few years, we will see more vacuum and controlled atmosphere applications, increasing use of low cost 60 cycle induction for heat treating, and the development of equipment to economically heat treat large low production items.

Improvements Noted in Surface Protection, Gas Carburizing

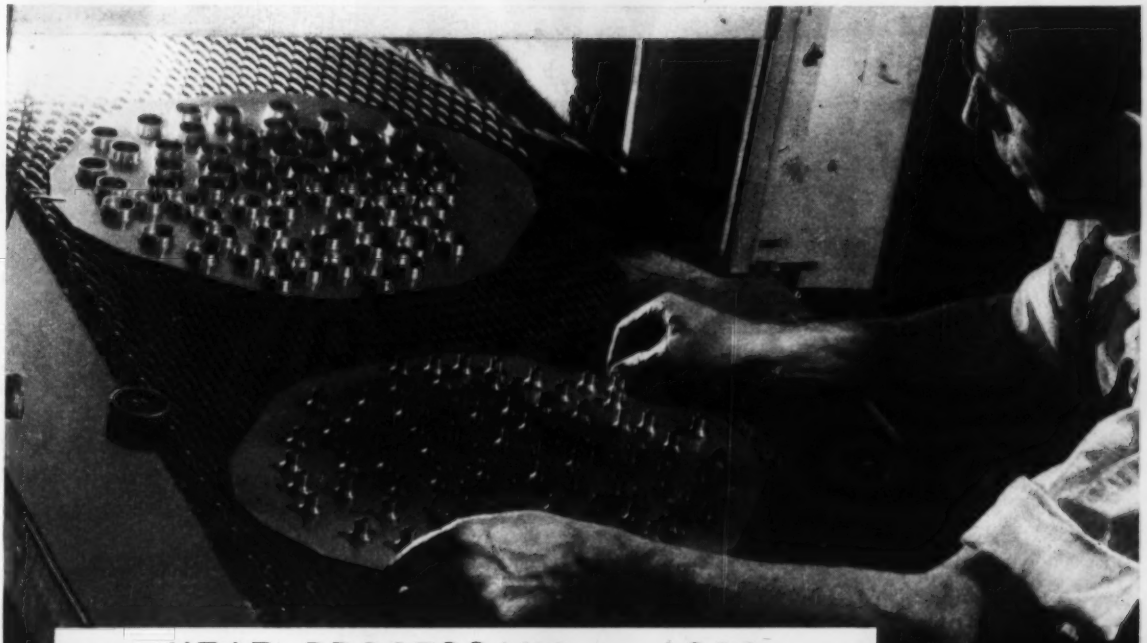
—W. A. DARRAH

• New and precise dew point controls and higher operating temperatures have greatly extended the usefulness of gas carburizing. It is now possible to obtain uniform and accurate control of the carbon content for any required depth. Further, by raising the carburizing temperature a hundred or more degrees, the time required in the carburizing zone can be reduced by half.

The development of rockets and missiles has introduced a series of new metallurgical and furnace problems.

One difficult problem is the accurate heat treatment of missile bodies which in some cases reach a diameter of 6 ft with a length of 30 ft. Close control of

(*Please turn to Page 274*)



. . . HEAT-PROCESSING - 1960 . . .

CAMBRIDGE METAL-MESH BELTS help you beat *today's* profit squeeze—give you the low-cost production and high product quality needed for the *competitive 60's!* Combined movement and processing speeds up annealing, quenching, washing, sintering, copper brazing, hardening, other operations. You cut labor costs, handling, production time.

Quality is consistent because liquids, gases flow through the belt and around product for thorough treatment.

You save on operating costs, too. Superior belt design and manufacturing techniques mean longer life, fewer repairs. Belts can be made heatproof or acidproof —in any mesh, weave, metal or alloy— with any side or surface attachments.

Call your Cambridge Field Engineer now. He'll be glad to discuss any aspect of Cambridge Belts—from manufacture to installation and service. Look in the yellow pages under "Belting, Mechanical". Or, write for FREE 130-PAGE REFERENCE MANUAL.

The Cambridge Wire Cloth Co.

Department J • Cambridge 1, Md.

Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications

ALLIS-CHALMERS . .

Products for steel: motors, m-g sets, rectifiers, control, pumps, *Texrope* drive equipment, crushers, grinding mills, screens, transformers, unit substations, switchgear, circuit breakers, turbine-generators, voltage regulators, blowers, compressors, condensers, and water conditioning equipment.

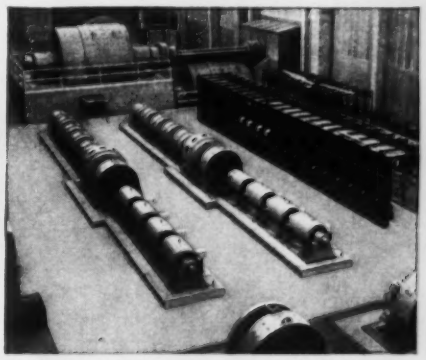
ALLIS-

in Step with STEEL

The blooming mill

Maximum electrical efficiency is assured in blooming mill operations where Allis-Chalmers equipment is used. From switchgear to drive motors, Allis-Chalmers offers a tailored system — engineered by mill experts and designed to keep high quality blooms rolling fast and accurately.

From mine to final processing—Allis-Chalmers equipment is in step with the increasing tempo of expanding steel production. Contact the nearest A-C office in your district, or write Allis-Chalmers, Milwaukee 1, Wisconsin.



Blooming mill motor room view shows components of the Allis-Chalmers electrical package. Switchgear, control, constant and variable voltage motor-generator sets, *Regulex* motor-generator sets, liquid rheostat, and twin drive motors are designed to work together for peak mill output.

Regulex and *Texrope* are Allis-Chalmers trademarks.

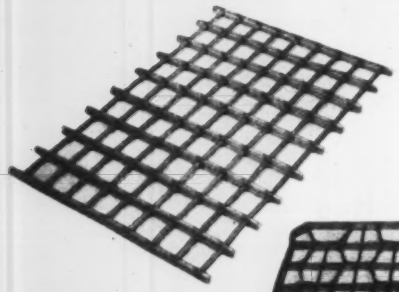
CHALMERS

A-C ALLIS-CHALMERS

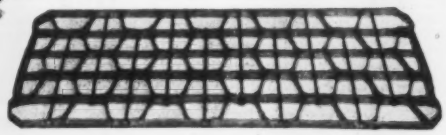
A-5411

ROLOCK
FABRICATED ALLOYS
HEAT AND CORROSION RESISTANT

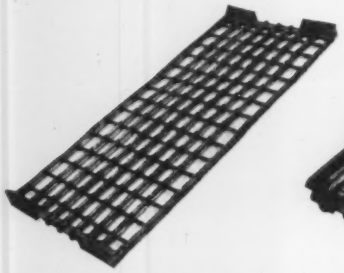
SILVER PLATTER SAVINGS
are served with these
ROLOCK TRAYS



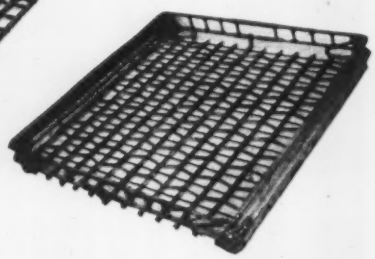
"Pressure Welded"
Furnished 2-layer
or 3-layer



"Serpentine"



"Pressure Welded"
with pusher pads



"Serpentine"
with load-retaining sides

ROLLER HEARTH FURNACE users have found these two basic Rolock Tray designs . . . and many possible variations . . . at once efficient and economical.

Not only can Rolock design and construction reduce tray weight (often by 25% to 50%) and thus increase pay-load, but service records frequently show that tray life has doubled or tripled.

These worthwhile savings have resulted from Rolock's engineering approach to tray design, taking into consideration details of the furnace hearth, tray load and weight ratios, method of operation, temperature limits and gradients and many other factors.

Complementing correct design, Rolock's unique "Serpentine" and "Pressure-Welded" construction features have proved to be, in many installations, the answer to problems of rapid tray deterioration. That is why Rolock today is a major supplier of furnace trays of these and many special types.

Why not make your own test. Let Rolock design and build your next replacements.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST

ROLOCK INC., 1262 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

1RL59

Heat Treating

H. B. OSBORN JR.
District Manager, Tocco Div.
Ohio Crankshaft Co., Cleveland

the physical properties of the metal is essential, as well as a surface free of scale and without change of carbon content.

The mechanical problems involved in handling an awkward cylinder of these dimensions, at high temperatures, and in controlled atmospheres, are substantial, but the additional requirement of an oil quench adds appreciably to the difficulty.

The commercial introduction of new metals and alloys, as well as the increasingly rigid specifications for surface conditions, have resulted in two heat treating approaches. One is the use of a vacuum. The other depends on a purified inert atmosphere—nitrogen.

Induction Heated Parts Grow In Size and Quantity

—H. B. OSBORN JR.

• The "big" push is on the induction heating field—"big" in size and "big" in numbers. Today, more than ever, we are aware that size is no obstacle and that every item going into an assembly is examined to see if induction heating cannot be used to process it at some point in its growth from a slug of metal to a finished part.

Larger production furnaces for melting tons of metal at a time, large induction coils measuring 20 to 30 ft in diameter for such things as missile components and radomes, and coils for the direct application of 60 cycles to steel billets (heating them for forging) illustrate bigness in size.

The heavy forging industry is taking a serious look at the latter application. Heavy billets and large ingots can be and will be economically heated by induction. At least one completely automated unit is planned for this year. It

Bear in mind—it takes SKILL and EXPERIENCE to Heat Treat Metals... Your Commercial Heat Treater provides BOTH

It takes more than equipment, no matter how modern, to perform the complex heat treating processes required today to achieve the property specifications of many metals.

Without the proper combination of operational skill and technical knowledge developed by years of experience, even the most mechanical, up to date equipment can become a menace to your product and a destroyer of your business.

Today the commercial heat treating industry has definitely established its position as the source of skilled, experienced heat treating for all types of metals. Whatever your heat treating problem, always consult your commercial heat treater FIRST.

THERE IS A HEAT TREATING SPECIALIST NEAR YOUR PLANT

American Metal Treatment Co.
Elizabeth, New Jersey

Anderson Steel Treating Co.
Detroit, Michigan

Benedict-Miller, Inc.
Lyndhurst, New Jersey

Bennett Heat Treating Co., Inc.
Newark 3, New Jersey

Cook Heat Treating Co. of Texas
Houston 11, Texas

The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio

Dominy Heat Treating Corp.
Dallas, Texas

Drever Company
Bethayres, Pennsylvania

Greenman Steel Treating Company
Worcester 5, Massachusetts

Fred Heinzelman & Sons
New York 12, New York

Alfred Heller Heat Treating Co.
New York 38, New York

Hollywood Heat Treating Co.
Los Angeles 38, California

Ipsenlab of Canada, Ltd.
Toronto, Ontario, Canada

Ipsenlab of Rockford, Inc.
Rockford, Illinois

L-R Heat Treating Co.
Newark, New Jersey

The Lakeside Steel Improvement Co.
Cleveland 14, Ohio

Metallurgical, Inc.
Minneapolis 14, Minnesota

Metallurgical, Inc.
Kansas City 8, Missouri

New England Metallurgical Corp.
South Boston 27, Massachusetts

Owego Heat Treat, Inc.
Apalachin, New York

Paulo Products Company
St. Louis 10, Missouri

Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania

The Queen City Steel Treating Co.
Cincinnati 25, Ohio

J. W. Rex Company
Lansdale, Pennsylvania

Stanley P. Rockwell Company
Hartford 12, Connecticut

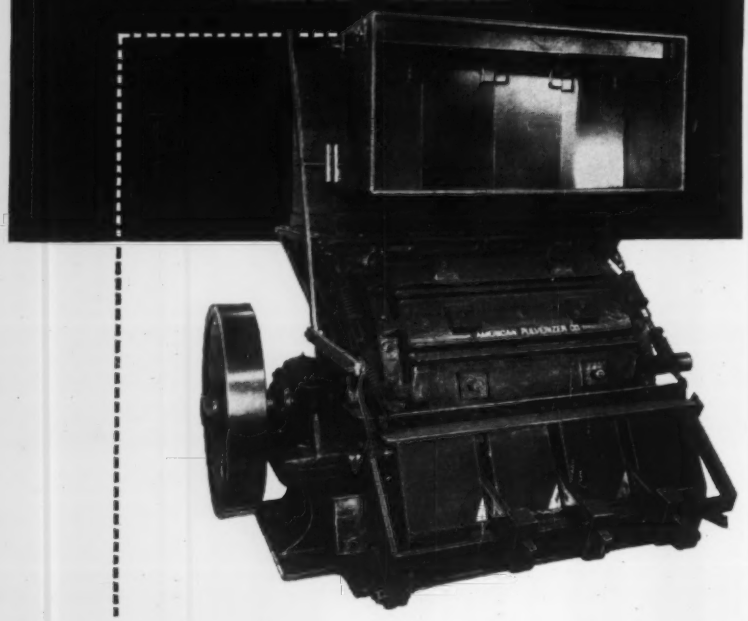
Scott & Son, Inc.
Rock Island, Illinois

Syracuse Heat Treating Corp.
Syracuse, New York

Temperature Processing Co.
North Arlington, New Jersey

This Advertisement is Sponsored By the Companies Listed Above—Members of the Metal Treating Institute.

convert metal turnings into cash

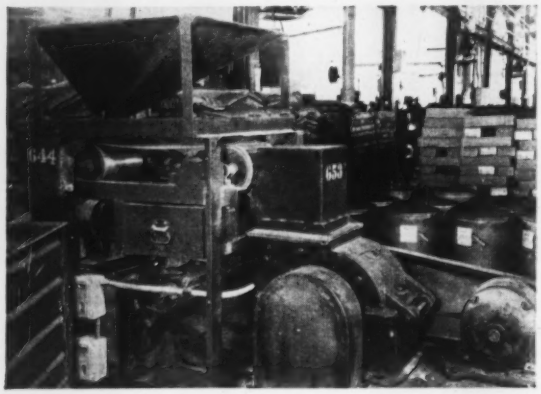


Long, curly, troublesome metal turnings, reduced in an American Metal Turnings Crusher, can produce additional profits for your plant.

Reduced to chip form, metal turnings bring $2 to $5 more per ton. Handling metal chips by shovel or pneumatic systems is easier, too, and chips require **75% less storage** space than bulky machine turnings. You'll recover more cutting oil from chips . . . up to 50 gallons per ton! More important, American Metal Turnings Crushers pay for themselves and produce substantial profits for years to come. Models available with capacities ranging from 1 to 50 tons per hour. To get all the details, write American today.

reclaim fused welding flux

One industrial plant saved more than $10,000 a year by using an American Welding Flux Crusher to regranulate fused welding flux. Write American for details.



American PULVERIZER COMPANY

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

1539 MACKLIND SAINT LOUIS 10, MISSOURI

Heat Treating

W. H. HOLCROFT
President, Holcroft & Co.
Detroit

will handle 1500-lb billets at the rate of one per minute, requiring 12,000 kw.

More Aluminum in Autos Boosts Heat Treat Equipment

—W. H. HOLCROFT

• A big demand for aluminum heat treat facilities in the coming year can be expected as the result of increased use of aluminum proposed by automakers.

Until recently, high volume automated heat treat lines for aluminum have been installed only in connection with wartime demand for aircraft. With the volume demands and quality controls required by the automotive industry, we can expect an increase in highly automated in-line equipment.

The basic heat treating problems inherent with high production are the same whether parts are ferrous or nonferrous. Handling, quality control, and over-all economy are typical.

Years ago, the automotive industry discovered that in finding the best handling methods it was necessary to consider production flow characteristics, the manual labor which could be eliminated, and the amount of automation desirable. In solving the problem of handling, it was often found that quality control and economy were improved. Over the years, the heat treat equipment in the automotive field has become the most highly automated in the world.

That same thinking will hold true in the swing to more use of aluminum. We can expect to see more and larger continuous heat treat equipment because of the many advantages involved. The design of such equipment will require not only a thorough knowledge of the heat treating requirements of aluminum but also a great deal of experience in the field of automated heat treating equipment.

introducing the ALL NEW SIZE 834 impactool...

1¼" capacity

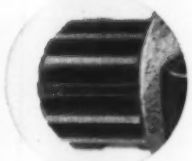
25% more power!

6¾ inches shorter!

7 pounds lighter!

than the size 534

optional features



Spline Drive Anvil

For transmission of maximum power to the socket, many prefer the spline drive which is optional. The closer fit and greater driving area also provide increased socket life.

Swivel Inlet Assembly

Where extreme maneuverability is a problem, the optional swivel inlet assembly makes the hose easier to handle.

Inside Trigger Handle

Preferred by some operators, the optional inside trigger handle prevents the possibility of the operator's hand being caught when the tool is used in extremely close quarters.

FREE! New Form 5248—describes the Ingersoll-Rand 834 Impactool in detail. Contains photos, specifications and lists standard and optional equipment and accessories.

WRITE TODAY! **Ingersoll-Rand**
11 Broadway, New York 4, N. Y.

for faster run-down, easier operation and better maneuverability in tight spots . . .

MOTOR Powerful new vane-type motor with direct drive to hammer provides greater torque and five times faster run-down. Motor housing is machined from a strong, lightweight alloy.

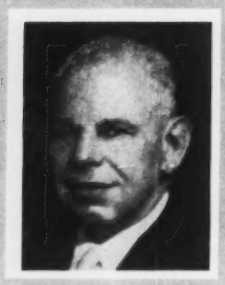
IMPACT MECHANISM New design operates at maximum efficiency to tighten the toughest nuts and bolts. Rated capacity, 1¼" thread size. No kick or twist is transmitted to the operator.

THROTTLE VALVE Graduated-action throttle valve permits quick homing of socket on nut. Rubber face provides positive seal; can be quickly and economically replaced when necessary.

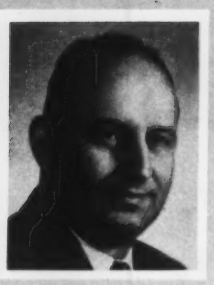
Ingersoll-Rand

Tools plus AIRengineering increase output per man

DR. WALTER S. BAIRD
Chairman of the Board
Baird-Atomic Inc., Cambridge, Mass.



ALEXANDER L. GOBUS
Product Manager, Industrial Radiographic Equipment, Philips Electronics Inc., Mt. Vernon, N. Y.



WILLIAM D. KIEHLE
X-ray Div., Eastman Kodak Co.
Rochester, N. Y.

A. J. STEVENS
Vice President, General Manager
Nuclear Systems Div.
Budd Co., Philadelphia

1959 FORUM ON TECHNICAL PROGRESS

Inspection and Testing

Inspection Costs Can Be Cut By Direct Reading Analyzers

—DR. WALTER S. BAIRD

• Direct reading, optical emission spectrometers will be of interest in 1959. They can produce significant savings in the melt shop and quality control laboratory.

Results are delivered to the melt shop within 10 minutes. Heats are often shortened.

Off-analysis heats are virtually eliminated and expensive alloying elements conserved.

Improved instrument design eliminates the need for special labs, lowering capital investment.

Other recent direct reading advances include the analysis of phosphorous and boron in steel and improved analytical precision for heat resistant, tool grade, and other high alloy steels.

Combination direct reading and spectrographic instruments will add new dimensions to many quality control operations. The versatile spectrograph is combined with the speed and precision of direct reading for routine and repetitive problems. Rapid conversion is possible from photographic to photoelectric techniques.

New direct reading problems may be conveniently set up by the user.

Other developments: A direct thermal imaging device which detects hot spots on blast furnaces and reveals worn furnace linings. It also tests honeycomb bonding.

Faster, convenient, and more sensitive techniques for determining carbon and sulfur are on the way.

Image Intensifier Broadens X-Ray Applications

—ALEXANDER L. GOBUS

• An intensive effort is underway to find a substitute for industrial radiography. X-ray fluoroscopy was one attempt, but poor detail, operator fatigue, and the absolute necessity for darkness restricted its potential.

Today's imaging tubes have immeasurably broadened industrial fluoroscopy. They intensify a fluoroscopic image so you can see clearly without a lightproof fluoroscopic enclosure.

Coupled with an image intensifier, fluoroscopy has these advantages for present and potential users:

1. Production time can be cut by as much as 90 per cent.
2. Film costs are eliminated.
3. Goods in process inventory can be substantially reduced.

The immediate future should witness more feet of welding inspected per weldment.

New uses for x-rays formerly thought too expensive, due to film technique, will now be carefully considered.

Quicker, Easier X-ray Method Being Tested

—WILLIAM D. KIEHLE

• Strip x-ray films, 360 degree radiation equipment, and gamma-ray sources have already speeded up the radiographic examination of parts and products. Automatic equipment for high speed radiograph processing will incease production and result in products of higher quality.

Automatic processing equipment for handling large quantities of sheets and long strips of industrial x-ray film has already reached the tryout stage. Trade testing indicates that such equipment provides precise control, uniform quality, and some solution to trained personnel shortages.

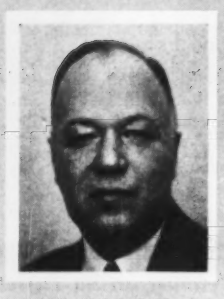
A new field for radiographic equipment is being surveyed: The inspection of welds in building and bridge construction.

New Method of Gamma Testing Needs No Film, Cuts Costs

—A. J. STEVENS

• During 1959, we expect continued expanded use of the gamma radiograph, particularly where strong sources show their value.

During the last year, 1000 curie, cobalt 60 sources in radiography machines have proved their value in heavy castings, shipbuilding, heavy plate fabrica-



W. K. LONSDALE
Chief, Industrial X-ray
Herron Testing Laboratories Inc.
Cleveland

C. H. HASTINGS
Senior Scientist, Materials Section
Research & Advanced Development Div.
Avco Mfg. Corp., Wilmington, Mass.

W. C. HITT
Nondestructive Testing, Materials & Processes
Douglas Aircraft Co. Inc.
Santa Monica, Calif.

LOUIS A. WELT
President, Steel City Testing Machines Inc., Detroit

tion, and inspection of solid rocket propellents. The sources require exposure times only somewhat longer than those of 2 million volt x-ray machines. Above 5 in. of steel or equivalent, radiographic quality of cobalt 60 is appreciably superior to that of high voltage x-ray.

Thulium 170 machines should also extend the useful range of gamma radiography below $\frac{1}{8}$ in. of steel equivalent, compared with about $\frac{1}{4}$ in. for iridium 192 today.

In addition, 1959 should mark the beginning of widespread use of noncontacting gamma thickness gages (particularly in hot-rolling mills). Scintillation counting has permitted high energy, gamma emitting isotopes which measure relatively thick sections of steel and other metals.

For the next few years, radiographic applications should double every year. In addition, gamma gaging should really come into its own.

Gamma probing, a relatively new method of nondestructive inspection, may supplant radiography in some areas. Although similar in principle to gamma gaging, the applications are much more closely related to radiography. Principal advantages: Elimination of film and the cost of processing. This system should be particularly valuable for inspecting centrifugally cast pipe.

Fluoroscope May Surpass X-ray Film in Inspection

—W. K. LONSDALE

• To meet the challenge of the missile age, x-ray tubes have been developed which can find the smallest flaw. In some, the focal spot area has been cut 99 per cent. Definition improvement is remarkable.

Today's fine grain x-ray film enables the radiographer to employ more sensitive techniques without increasing labor costs.

The near future will see the further development of fluoroscopic inspection with image intensifiers and closed circuit TV systems. The method is especially adaptable to semiautomatic inspection of large quantities of similar parts. Parts will be handled mechanically—technicians will do the scanning. Completely automatic inspection will come later.

The solution of one technological problem would greatly enhance the use of fluoroscopy: The development of fluors especially sensitive to gamma and high voltage x-rays.

Since it is desirable to penetrate the maximum possible thickness, the energy level must be high. Remote viewing by television is a distinct advantage as a means of maintaining safety of personnel.

Of course, the basic advantage of fluoroscopy (no film costs), remains as important as ever.

Standardization Slated for Major Role in Testing Progress

—C. H. HASTINGS

• Nondestructive testing's most urgent need is for greater appreciation by engineering management. Too many are as yet unaware of the relatively large cost savings being realized by new users.

In the next few years, we look for the greatest progress in standardization and specifications which prescribe the conduct of nondestructive tests. Such activities are being undertaken by: The Society for Nondestructive Testing, American Society for Testing Materials, American Society of Mechanical Engineers, Society for Automotive Engineers, Aircraft Industries Association, American Iron & Steel Institute, and trade associations with special subcommittees.

Standardization efforts emphasize the limitations of commercial equipment so you can expect better designs to appear. Look for such efforts eventually to provide tests which are quantitative, rather than qualitative, and for which reliabilities can be stated.

Testing Needs More Research, Training, and Better Standards

—W. C. HITT

• During 1959, aircraft companies will apply semiautomatic ultrasonic equipment to inspect metal to metal bonds (work toward establishing standards will be completed) and brazed honeycomb panels. Additional ultrasonic researchwork will be completed to establish aircraft reference standards for high strength steels and stainless alloys. Fatigue data will be accumulated and used to evaluate flaws found by ultrasonic testing.

Combined high voltage x-ray and ultrasonics may be the next major step in the reliability program of dry propellent missiles. The combination offers great potential for lack of bond, cracks, and voids.

In-motion x-ray, ultrasonics, and magnetic particle inspection will be widely used to test high strength steel alloys.

Mechanized eddy current ultrasonics and magnetic particle inspection of jet engine parts will be expanded during the next few years in manufacturing and overhaul.

The development of nondestructive testing techniques and equipment brings with it the problem of correlating the data obtained with actual measurements of strength and serviceability of the part or material. This may well be our greatest problem in the coming year. More emphasis must be placed on application research, standards, and personnel training.

Industry Must Find Way To Establish Standards Laboratory

—LOUIS A. WELT

• In the field of calibration, look for more interest in accuracy for force-measuring and load-measuring devices. (They are important to the missile and aircraft industries.) Such work is becoming too great for the National Bureau of Standards to handle alone and private organizations may have to establish their own

Inspection and Testing

J. E. REIDER
Manager, Metals & Mining Div.
Industrial Nucleonics Corp.
Columbus, Ohio

V. E. LYSAGHT
General Sales Manager
American Chain & Cable Co. Inc.
New York

FRANCIS G. TATNALL
Tatnall Measuring Systems Co.
Subsidiary of Budd Co.
Phoenixville, Pa.

calibration laboratories with intermediate standards such as our own optical proving rings.

Physical-property testing of metals is becoming more closely allied to production and production control. Testing has become easier and more nearly foolproof, and equipment will become more single-purpose rather than universal.

We don't expect basic equipment or methods to change for such qualities as hardness and tensile strength. Chief change will be on physical properties at elevated temperatures.

Coming: Marshaling of Plant Output Data in 15 Minutes

—J. E. REIDER

• Some time within the next decade, you will be able to read a report at 10:15 a.m. of your production and cost figures for the hour ended just 15 minutes previously. The report will contain information on prime material value, reject material value, raw material costs, labor overhead, and profit for the entire company. Such efficiency is the goal of our technology.

Business information delays of weeks or months must and can be shortened to minutes through production control systems. Automatic data processing equipment that not only records what is happening but constantly compares performance against goals will give management a tremendous lever against rising costs.

The higher income of Americans is also reflected in higher payrolls. It is generally accepted that such costs now amount to 45-55 per cent of the business total.

To obtain maximum performance at the least cost, management must be able to point out and correct immediately inefficient groups, departments, or practices with the same efficiency now obtained on machines with automatic feedback control.

New Device Checks Metal Hardness in 1500° F Furnace

—V. E. LYSAGHT

• Hardness testing is rapidly becoming a vital tool of modern metallurgy because of the growing relationship between product quality and hardness.

That has led to new and faster methods of mass production testing. Fully automatic machines can check 1000 pieces an hour.

Microhardness testing is gaining favor with metalworking people. It is the only way to measure the hardness of tips on cutting tools, watch springs, precision parts, superficially hardened surfaces, or sections 0.0005 in. thick.

There is a need for more microhardness testing to check and sort workpieces. This year will see the introduction of a high-capacity tester with a limited range of static indentation loads. It will greatly facilitate testing hard-to-handle metals.

Production hardness testing with statistical quality control is coming of age.

There has been need for a hand-operated unit to Rockwell and superficial test with a minimum of changeover time. Such an instrument is in use, and this year will see many advances.

When handling high temperature rocket metals, the metallurgist cannot afford to guess. A hot hardness tester has been developed which measures while inside an atmosphere furnace at 1500° F. Such tests will enable the engineer to follow the course of structural phenomena as metals are heated and dropped to room temperatures.

New Stress Indicator Changes Color To Show Strain Pattern

—FRANCIS G. TATNALL

• The next few years will see a need for reliable methods of measuring strain, load, pressure, and torque at high and low temperatures, shock, vibration, erosion, and corrosion. Means of achieving such goals are in sight: Load and pressure cells, torquemeters, accelerometers, and strain gages will be stable at 1000° F or better. Pedigreed strain gages make that possible.

A pedigreed strain gage is one which has been thoroughly evaluated under temperature cycling, thermal stress, and all environmental conditions. It is the only satisfactory way of measuring thermal stress.

Other problems are the cements and metal gage covers. They must resist temperature, moisture, erosion, oxidation, and mechanical damage, yet be fluid enough to be brushed.

Another new technique is Photostress. It is a photoelastic coating that turns strain into color and provides a complete visual pattern of strain distribution. The pattern is read by instruments which turn color into electrical signals for accurate readout.

The system dramatically reveals strain concentrations, notches, pits, structural misalignments, and dynamic variables. It can be used at or near room temperature, is not affected by water or other fluids, is responsive to the severest impact and high frequency dynamic strains, and will freeze in the complete strain pattern around a fracture.

Suggests Nondestructive Test To Aid Nuclear Progress

—WARREN J. McGONNAGLE

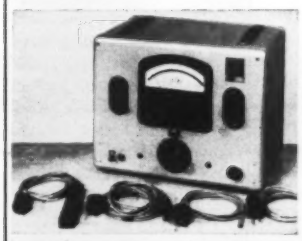
• Rapid progress has been made in the development of adequate instrumentation for nondestructive testing in the nuclear energy field. However, I predict that eddy current testing will make the biggest advance in the next few years. It is beginning to emerge as a useful testing tool because of fundamental study and instrumentation advances.

Nuclear engineers are demanding more of old and new materials. To learn more about them without decreasing the safety factor, new techniques must be developed to find deficiencies. Engineer-

(*Please turn to page* 282)

MAGNAFLUX CORPORATION

offers you industry's broadest range of testing systems and equipment for nondestructive testing

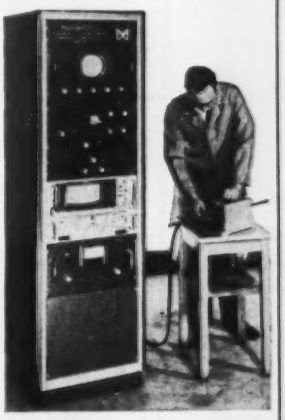


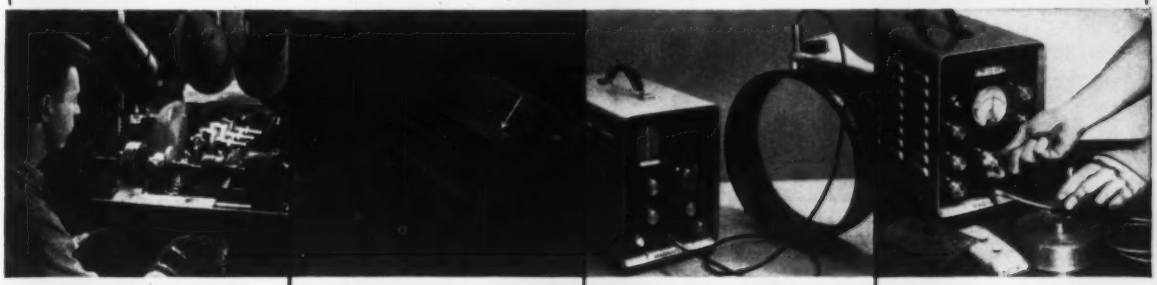
MAGNATEST FM-200 PRECISION MAGNETIC FIELD METER

An extremely sensitive eddy current measuring instrument for DC magnetic fields. Used for many applications in geophysics, magnetic investigations, military use and in nondestructive testing of magnetic materials. Responds to steady state fields and the field of direct current. Measures weak fields in presence of stray fields and determines amount of residual field remaining in a piece after demagnetization.

MAGNATEST FW-400 SERIES NONMAGNETIC ROD, WIRE or TUBE INSPECTION

Detects seams, cracks, concentrated porosity, inclusions, stringers, laps and splits automatically. Finds diameter variation, embrittled areas and scale. Provides completely automatic, high speed production of copper tubing. Inspects aluminum rod for voids, scale and other conditions which cause trouble in drawing or final wire. Designed for heavy industrial use.





MAGNAFLUX-MAGNAGLO®

The most used method on magnetic metals, for surface and sub-surface defects. Highest production speeds, controlled sensitivity. Biggest to smallest units, including portable and hand type.

ZYGLO® and ZYGLO-PENTREX®

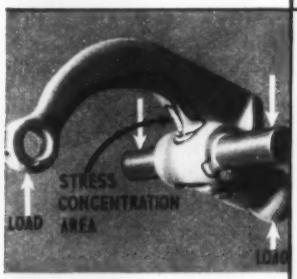
Chiefly for nonmagnetics for defects open to the surface. Fluorescent penetrant, black light. Practically any volume and speed required. Controlled sensitivity. Also portable kits and leak tests.

SONIZON®

Ultrasonically measures thickness from one side only in tank walls, cast, formed or welded products, etc. Also discovers sub-surface defects, laminations and lack of bond.

MAGNATEST®

Electronic eddy current instruments. Numerous types with industry-wide application. Conductivity, magnetic fields, dimension, hardness, alloy, coating thickness, cracks, etc.



STRESSCOAT®

Brittle coating stress analysis tool. Helps in designing stronger parts with less weight. Shows stress distribution, direction, and stress level over entire part.

SPOTCHECK®

Low cost, spray-on red dye penetrant inspection for maintenance or sampling on small surface areas.

STATIFLUX®

Electrified particle inspection for cracks and pores in nonconductive materials—ceramics, glass, enamels, plastics, etc.

PARTEK®

Filtered particle inspection for cracks in unsintered powdered metal compacts, ceramics and porous solids, including concrete.

MAGNAFLUX CORPORATION

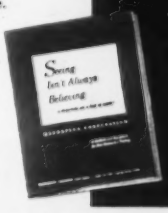
THE HALLMARK OF QUALITY IN NONDESTRUCTIVE TESTING

Take Your inspection problems to the House of Answers

MAGNAFLUX CORPORATION

7312 W. Lawrence Avenue
Chicago 31, Illinois

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 35 • Los Angeles 22



KEEP UP TO DATE ON MX TEST SYSTEMS—

The methods and latest developments. Call in a Magnaflux Engineer . . . or write for copy of "Seeing Isn't Always Believing" containing briefed information on *all* Magnaflux test systems.

Inspection and Testing

WARREN J. McGONNAGLE
Group Leader, Nondestructive Testing
Argonne National Laboratory
Lemont, Ill.

HAMILTON MIGEL
Vice President, Engineering & Research
Magnaflux Corp., Chicago

ing data are needed to correlate physical and mechanical properties with testing results. In addition, we need realistic standards and procedures.

One of our major problems is achieving economical or competitive nuclear power. If that goal is to be achieved, fuel elements must have a long useful life in the reactor. Nondestructive testing can contribute much toward that goal, but there is a need for fundamental research and development.

Magnetic Particle Inspection Will Win New Uses

—HAMILTON MIGEL

• In 1959, the steel industry will greatly expand Magnaglo inspection of semifinished mill products. Part of the reason is a new fluorescent magnetic particle which is flowed over a magnetized part in water suspension. When viewed under black light, they produce brilliant indications of otherwise invisible cracks or seams.

Teamed with semiautomatic conveyors, the system processes 400 tons an hour. (Billets are 5 in. square, 35 ft long.)

The technique has two basic advantages: It eliminates pickling, visual inspection, and billet skinning which removes a lot of good material; it reduces scrap or unsatisfactory material.

That kind of inspection, combined with spot conditioning, has increased yields some 4 per cent. That amounts to about $4 a ton.

Two mills have Magnaglo installations. Two more are being installed. Several others will be completed in 1959.

Studies now being made indicate that Magnaglo will work on slab conditioning in plate, sheet, and strip mills, with comparable savings.

Eddy current inspection is finding favor as a production test for finished steel products for metallurgical variations in finished steel products. Forged automotive connecting rods are being checked by low frequency eddy current equipment to control heat treatment. Bearing balls and races are being automatically tested for hardness. Rate: 10,000 an hour.

Neutron Radiography Could Improve Missile Inspection

—E. ALFRED BURRILL

• The Space Age has created inspection problems that are beyond those of the more "mature" nuclear types.

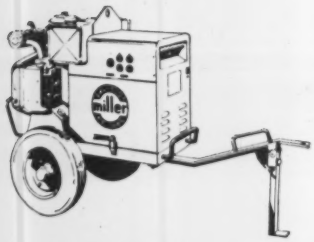
New materials have to be inspected: Solid rocket propellents, missile assemblies, Pyroceram components, missile frameworks, and envelopes.

Missiles require a new concept of quality control: They must be perfect when first fired. That means extremely rigid inspection procedures. Nuclear systems al-

THE ENGINE-DRIVEN WELDER/ POWER PLANT with the

100% DUTY CYCLE

An original Miller design with performance standards, ruggedness and versatility that have made it a top hand from the Texas oil fields to New York dairy farms. Because, whether the AEA-200-L is hub deep in mud welding a derrick brace, or supplying power for lights and milking machines, or answering an emergency call aboard a repair ship. . . . IT DELIVERS. Currently a best seller in the highway construction market, the Miller AEA-200-L is handily the "finest in the field," and here's why:



- All-weather construction
- Onan 12.9 h.p. air-cooled engine coupled directly to generator
- Full 225 ampere output
- 100% DUTY CYCLE
- 5 KW, 110/220v ac
- 1 KW, 115v auxiliary dc
- Uses any ac or ac-dc 1/16" to 3/16" electrodes
- Seven station amperage selection with continuous current control

Other Miller welder/power plants for metallic arc and TIG welding to 350 amperes.

Complete particulars will be sent promptly.

miller ELECTRIC MANUFACTURING COMPANY, INC., APPLETON, WISCONSIN
Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

ready require the exploitation of nondestructive testing to the fullest. Precision radiography, with supervoltage penetrating power, will be increasingly utilized.

Present limits of radiography will be pushed back by 10 million electron volt x-ray generators like the microwave electron accelerators. They will inspect thicker steel, bulkier rocket propellents at higher exposure speeds.

With tomorrow's unusual materials will come more suitable methods of inspection. Neutron radiography is untried but promising. Light materials absorb neutrons to a greater degree than heavy ones, somewhat the reverse of x-ray absorption processes. The method could prove valuable in nuclear and missile inspection. Relatively compact particle accelerators can provide the powerful neutron sources for this type inspection.

There is an urgent need for greater recognition of a nondestructive testing engineer. During the next few years, educators and industrialists will recognize this field as a profession rather than a technique.

Greater Emphasis on Quality Expands Nondestructive Test

—JOHN C. SMACK

• Increasing demand for more reliability in nuclear reactors, rockets, missiles, and supersonic airplanes means greater emphasis on nondestructive tests in 1959. Effectiveness will be affected by quality control in other industries.

For 14 years, there has been fast improvement in metal processing which has been matched by continuous improvement of test instruments.

Quality control is important to the survival of this nation. Failure of important missiles or combat aircraft at a crucial moment could be fatal.

Further automation of ultrasonic immersion testing and some applications of contact testing are a must. Requirements for the recording of 100 per cent testing have resulted in flexible recording systems, such as electrosensitive paper records 30 in. wide. We expect they will be used extensively in 1959.

Simplification of test equipment is progressing application by application. An example is the single-frequency ultrasonic tester complete with defect signals and a multiple transducer for finding fatigue cracks in freight car axle journals. Results: Smaller and fewer controls and elimination of operator interpretation. It costs less, is faster, and more efficient. By 1960 and 1961, look for many other specialized ultrasonic test instruments.

The need for operator judgment will be reduced with automatic electronic analyzing circuits and improved knowledge of metals.

Inspection and Testing

E. ALFRED BURRILL
Vice President and Sales Manager
High Voltage Engineering Corp.
Burlington, Mass.

JOHN C. SMACK
Staff Asst. to General Manager
Princeton Div., Curtiss-Wright Corp.
Princeton, N. J.

5,106,250 LABORATORY DETERMINATIONS AND STILL GOING STRONG!

A LARGE METALS PRODUCER REPORTS ON THE BAIRD-ATOMIC DIRECT READING SPECTROMETER:

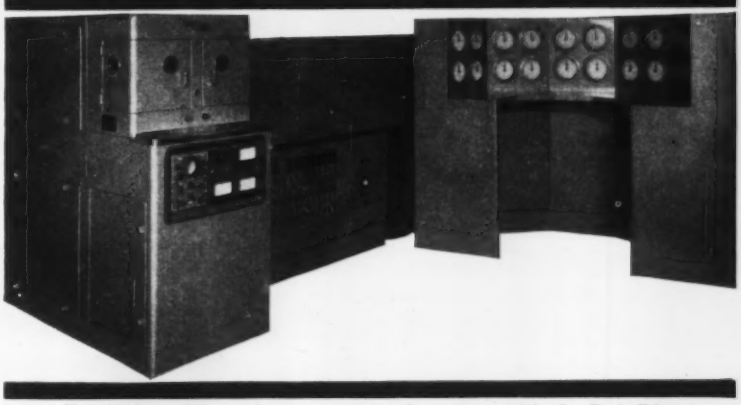
"During the past *10 years* we have used the Baird-Atomic Direct Reader for spectrochemical analysis making 5,106,250 determinations in 377,350 tests controlling 70,920 heats.

"Our laboratory costs, per determination, were reduced from *91¢* by chemical analysis, to 4¢ with the B-A Direct Reader. Analytical time per test was reduced from *26* minutes to *5* minutes, saving *21* minutes of furnace time (rated at $1.50 per minute), on every test.

"Additional savings include: reduced loss of alloying elements — longer furnace lining life — increased efficiency in production planning — elimination of 'off heats'.

"Of course, the most important result is our ability to produce a HIGHER QUALITY PRODUCT for our customer."

This report on the B-A Direct Reading Spectrometer exemplifies the *long term reliability and substantial savings* made possible by this unique, rapid method of spectrochemical analysis.



For information on how you can reduce costs with the B-A Direct Reader, write to:

Baird-Atomic, Inc.

33 UNIVERSITY RD., CAMBRIDGE 38, MASS.

Baird Atomic

Instrumentation for Better Analysis

Clevelands drive cooling bed of highly automated Canadian tube mill

Here is the cooling bed—driven by 3 Cleveland speed reducers—of the world's first completely automated seamless tube mill. It was built by Mannesmann-Meer Engineering & Construction Co., Inc., Easton, Pa., and installed at the Sault Ste. Marie plant of Mannesmann Tube Company.

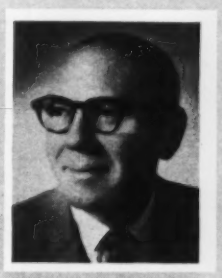
Practically everything in the entire plant is automatic—handling of materials from stage to stage, as well as individual operations.

You'll find Clevelands in nearly every steel plant in America—wherever dependable, heavy duty drives are demanded—many of them in continuous service upward of 35 years. Write for new Bulletin 145 which shows the many types available in the Cleveland line. The Cleveland Worm and Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

CLEVELAND
Worm Gear
Speed Reducers

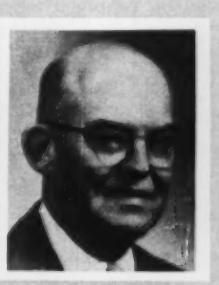
Affiliate: The Farval Corporation, Centralized Systems of Lubrication.
In Canada: Peacock Brothers Limited.

J. M. COOK
Vice President—Marketing
Cutler-Hammer Inc., Milwaukee



JOHN C. SEARS
Executive Secretary, American Gear
Manufacturers Assn., Washington

P. D. ROSS
Manager—Marketing, Direct Current
Motor & Generator Dept., General
Electric Co., Erie, Pa.



JOSEPH E. OTIS JR.
President, Dodge Mfg. Corp.
Mishawaka, Ind.

FORUM ON TECHNICAL PROGRESS

Drives and Controls

Better Transducers Needed For Feedback Functions

—J. M. COOK

• The static rectifier package is assuming prominence in converting alternating current power to controlled direct current for driving and speed regulating motors on individual machines as well as complete processing lines.

A continuing trend toward increased production through high speed automatic operation demands better and more sophisticated control of speed, tension, and accelerating forces.

Specialized control system requirements are no longer the exception—this applies to new equipment designs as well as the modification of process lines. New products and new engineering techniques will continue to be required in abundance. New and better transducers to feed back more reliable and more precise measurement information to the controller are needed now.

Standards for Gear Strength, Durability Nearly Completed

—JOHN C. SEARS

• Manufacturers of enclosed drives are continuing their efforts to build more horsepower into smaller packages.

Demand for closer tolerance gearing remains unabated. We have the tools and knowhow to produce but must necessarily remain within the accuracy limits of available inspection equipment.

Certain gear applications in atomic energy, unmanned aircraft, and missiles are slow in developing because of unsolved problems.

The German DIN and Japanese gear classification data are occupying much of our attention. A project now underway should in the not too far distant future produce comparable data, tailored to U. S. gear design and manufacturing methods.

It is anticipated that the data will be presented to the gear buying public in the form of a standard on purchasing specifications.

Another AGMA project that is well on its way to completion is "standardizing" gear strength and durability formulas. These data will, for the first time, give designers every now known factor that affects the strength and durability of a gear.

Electrical Developments Coming in Metalworking

—P. D. ROSS

• Direct current adjustable speed drives, using new power conversion techniques, promise increased efficiency and reduced maintenance in machine tool and mill auxiliary applications.

Improved sensing devices to supply anticipatory corrective signals in automated systems are being developed. It is expected that such devices will result in substantially improved quality and reduced costs in primary metal production and automated machining.

Programmed machine tools are assuming increasing importance in the mechanization of job shop operations.

Data logging equipment will improve the knowledge and understanding of steelmaking. Computers will be used increasingly to determine improved techniques. Growing utilization and effectiveness of programming will be of vital consequence in the further automation of the steelmaking process.

Looking farther ahead, the electrical industry is doing important and potentially far-reaching research into basic energy sources. Long range projects are concerned with investigation of unconventional energy sources such as thermionic generators, fuel cells, solar batteries, and nuclear-thermal batteries.

Belt Drives Getting Smaller, Use Less Space

—JOSEPH E. OTIS JR.

• Economy of weight and space are the prime objectives in the design of new power transmission equipment.

To save power, prolong the life of costly machinery, and avoid wasteful downtime for repairs, industry will be using new devices to cushion mechanical

Drives and Controls

JOHN V. EAKIN
Vice President, Fawick Airflex Div., Fawick Corp., Cleveland

W. C. DENISON
President, Denison Engineering Div. American Brake Shoe Co. Columbus, Ohio

E. H. BROWNING
Manager, Metal Working Section Industrial Engineering Dept. Westinghouse Electric Corp. East Pittsburgh, Pa.

ROBERT H. HOGE
President, Clark Controller Co. Cleveland

starts and to reduce wear and tear on belts, gears, and other moving parts.

Use of controlled acceleration devices like dry fluid drives and couplings by makers of processing equipment and conveyors will increase. Besides affording overload protection to machinery and motors, such drives and couplings will reduce waste in the processing of fragile materials like thread and wire.

An outstanding development in power transmission this year will be the introduction of V-belt drives that feature smaller, lighter, and stronger sheaves and belts (Dodge's Dyna-V line). The drives will enable engineers to design more power into less space.

Space saving considerations will also dictate the use of more shaft-mounted speed reducers for both industrial and original equipment applications. New reducers will deliver higher horsepower than any previously available for mounting on shafts. New reduction ratios and special purpose adaptations, like screw conveyor drives, are developments to watch in the speed reducer field.

Maintenance costs in many plants are being reduced substantially with new shaft couplings which require no lubrication and will compensate for more misalignment than conventional types for longer periods.

Faster Speeds Create Press Safety Problems

—JOHN V. EAKIN

• Two significant trends in metalworking will have an impact on the design and operation of clutch coupled drives: 1. The emphasis on faster speeds and greater accuracy. 2. The desire for increased operational safety for the machine and operator. Both problems are tied to the growth of automation.

With higher speeds and greater precision, machine operation becomes more hazardous. Accidental operation of a press can damage expensive dies, cause costly downtime that might cripple an integrated automatic operation, or injure the operator.

One approach is a new control system, developed by Fawick and Textrol Inc. It has two identical sets of components that monitor each other for failures. When one component fails, the system stops the machine and prevents operation until the failure is repaired. Repair of the control system is infinitely faster and simpler than repairing the machine or dies.

Product Research Will Spur Shift to Hydraulic Equipment

—W. C. DENISON

• Industry will continue to emphasize the trimming of production and processing costs this year.

Research will play a big part in the effort. With new industrial horizons constantly dawning as a result of fundamental research, applied product research must be stepped up to bring the benefits of this work to our industrial economy.

We will step up our research during 1959. The increased use of hydraulic equipment in automated installations will be one of our major targets.

Metalworking Will Use More Digital Programming Controls

—E. H. BROWNING

• An extension of digital programming controls in metalworking is a certainty. The near future will see improvements and additions to further improve process productivity and product quality. Computing stages eventually will do most of the work now done by the human programmer.

Most of the high quality process controls in metalworking employ static magnetic amplifier types of regulating devices. The next phase will be the substitution in many cases of digital types of controls to give even better results than are possible or practical with the familiar analog forms of regulating systems.

Another area in which considerable work is being done involves the accumulation, logging, read-out, and treatment of process data. Such systems will be aimed toward permitting quick over-all appraisals of process operation by making available all the data necessary to effect a valid decision. Further, such systems will permit feeding back such treated data into the process controls and in effect will result in the incorporation of the product itself into a closed loop control system.

Static Devices Will Promote More Automatic Processes

—ROBERT H. HOGE

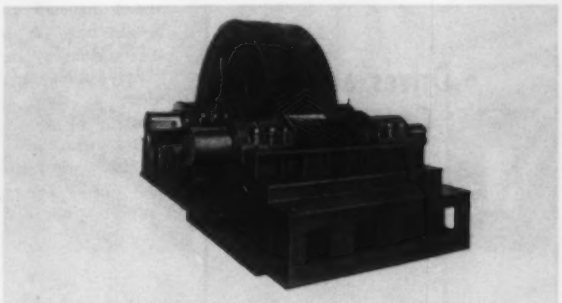
• We believe the greatest innovations in industrial control will come from the application of static devices.

It is not necessarily true that static devices will replace the conventional electromechanical devices that might be referred to as conventional controls. In many cases, transistors will replace relays. Magnetic amplifiers will be doing the work done by contactors and relays in some applications.

Static and electromechanical devices are not altogether competitive; they are often supplementary. We believe greater use of static devices will lead to more automatic processes that will increase the demand for electromechanical devices.

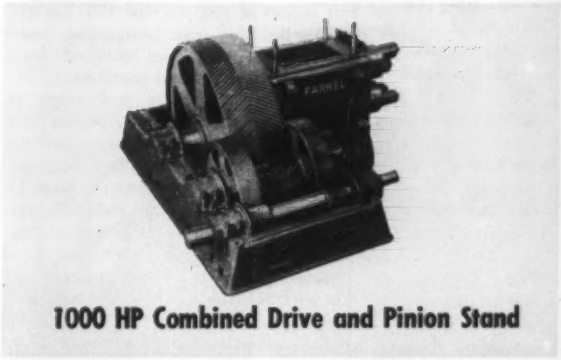
Larger crystals must be grown to increase the capacity of transistors applied to power circuits. Also, progress is needed in the design and manufacturing meth-

SPECIAL DRIVES FOR SPECIAL JOBS



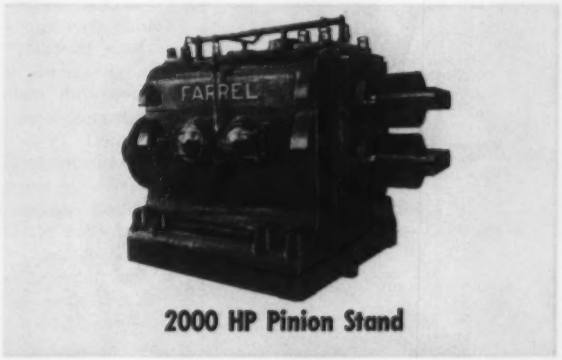
5500 HP Single Reduction Unit

Herringbone geared reduction unit designed to transmit power to a 134" three-high sheared plate mill, reducing motor speed from 375 to 70.35 RPM.



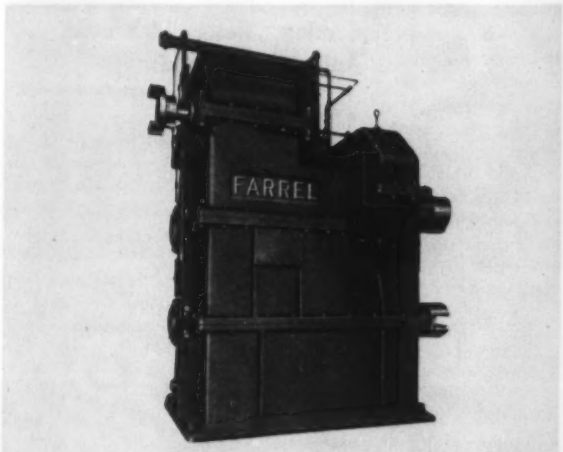
1000 HP Combined Drive and Pinion Stand

Designed to transmit power to a two-high cold brass run-down mill. The first reduction gears are opposed single helical. The second reduction gears and the mill pinions are Farrel-Sykes continuous-tooth herringbone.



2000 HP Pinion Stand

21" pinion stand, designed to transmit power to a four-high aluminum sheet mill. Heat-treated, forged steel pinions are continuous tooth herringbone, generated by the Farrel-Sykes process.



150 HP Triple Reduction Unit

The three pairs of continuous-tooth herringbone gears of this special tube mill drive provide a ratio of 113 to 1. A pinion unit is built as an integral part of the drive.

Whatever your mill drive requirements, no matter how unusual in design, size or capacity, Farrel will meet them. As in the examples given, each unit is individually engineered for the application.

Each Farrel unit is designed to assure top drive efficiency, plus the strength to withstand the shocks, stresses and wear encountered in continuous, heavy duty service.

Gear drives are made with herringbone, single helical, or a combination of single and double helical gears. Pinions are usually herringbone type, although single helical pinions may be supplied. Gears and pinions are precision-generated by the famous Farrel-Sykes process, assuring accuracy of tooth spacing, profile and helix angle. Result: High efficiency and smooth, quiet operation.

Why not discuss your gear drive problems with Farrel engineers?

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

Sales Offices: Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Los Angeles, Salt Lake City, Tulsa, Houston, Fayetteville (N.C.)

European Office: Piazza della Republica 32, Milano, Italy

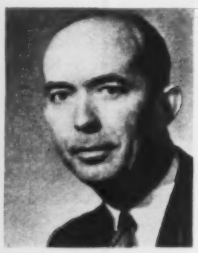
FB-1063

FARREL® METALWORKING MACHINERY—Rolls • Slab, Rod and Strip Handling Equipment • Rod Coilers • Slitters • Gears • Gear Drives of Any Capacity • Mill Pinions • Pinion Stands • Universal Mill Spindles • Flexible Couplings • Roll Grinding Machines • Roll Calipers • Hydraulic Presses for Extruding, Forming, Drawing, Forging, Trimming, Hobbing, Straightening and Bending.

Farrel-Birmingham®

Drives and Controls

C. C. LIBBY
Manager, Electrical Dept., Fairbanks, Morse & Co., Fair Lawn, N. J.



T. H. BLOODWORTH
Chief Systems Engineer, Electrical Application Dept., Industrial Equipment Div., Allis-Chalmers Mfg. Co., Milwaukee

WILLIAM A. THOMAS
Vice President—Engineering
Electric Products Co., Cleveland

ods of magnetic amplifiers to bring these devices into the economic range of many applications.

Application engineers are using the devices, as they are developed, in the solution of more control problems. In this application work, problems of design in the components are coming to light, and better transistors and magnetic amplifiers are being produced.

New Insulating Materials Will Widen Motor Potential

—C. C. LIBBY

• New motor designs will be influenced to a greater degree by new insulating materials than any other single factor.

Such materials as the silicones, epoxies, and alkyds will be used in combination with traditional Class A and B insulations. They will provide resistance to attack by a variety of atmospheric contaminants and will permit new combinations of motor size, temperature rise, overload capacity, and enclosure without a reduction in the life expectancy of the motor winding.

To make full use of new insulation capabilities, a simple, accurate and relatively quick test and evaluation procedure is needed. Prediction of insulation performance and probable life under field conditions and translation of ambient-load conditions into measurable performance requirements are necessary.

A second major development is the acceleration of the trend toward integral design of the motor and driven machine. In sizes up to 100 hp, motor and load will become increasingly identified in mechanical design, employing such features as a common shaft, ventilation, lubrication, bearings.

Motors may be designed for specific load conditions to utilize maximum capacity of active materials with minimum motor weight and without regard to generally applicable service factors.

Static Power and Control Coming to Steel Industry

—T. H. BLOODWORTH

• Emphasis in the metals industry this year will be on the upgrading of facilities to obtain increased tonnages at lower cost per ton.

Hot-strip mills will be updated by coupling new motors to the shafts of the drive motors. Mercury arc rectifiers, operating in parallel with direct current generators, will meet control and added power requirements.

The first feedback control system for automatic gage regulation on the finishing stands of a hot-strip mill will be put in operation early this year. Punched card programming is not included but can be added. Data logging equipment provides information on off-gage or other defects in the finished product.

Emphasis in cold metal facilities will be on tempering and processing work. Maximum speeds of tin temper mills will be increased with improved regulating systems.

Application of static power supplies for mill auxiliary drives will increase, both in numbers and horsepower ratings. Semiconductor rectifiers for electrolytic tin plating will gain increased acceptance. Introduction of the power transistor or controlled static rectifier in ratings comparable to today's diodes will greatly accelerate this trend.

Static, 250 volt mill supply power, with unit ratings of 1000 kw and 1500 kw will be installed this year. Designs are based on operating experience obtained from successful lower powered installations.

Expanding availability and usage of static power and control elements and systems will have the greatest impact on industry in the next few years. Semiconductor manufacturing techniques must be mastered to increase the yield of high voltage diodes and furnish greater uniformity of product.

Semiconductor triode developments will take several years to reach a proficiency comparable to today's diodes. Static devices for switching high power direct current systems are needed.

Coming: Better Generators, Adjustable Speed Drives

—WILLIAM A. THOMAS

• Many developments have never reached their full potential. One example is the gas turbine. The high speed device has been held back because electrical generators are limited to 3600 rpm at 60 cycles and must be coupled to the turbine by a set of gears.

But we can expect a breakthrough in the near future. We are now able to obtain 60 cycles, or any other frequency, from power sources which operate at 6000, 12,000, and even 24,000 rpm. These generators give great promise for obtaining electrical energy from higher speed sources.

Providing excitation for motors and generators has always been a seemingly wasteful requirement. We now have excellent permanent magnets, and significant improvements are on the horizon. Means are available to build Alnico magnets into generators as flux sources without paying a heavy premium.

Recent technical developments have improved design methods to fully utilize the permanent magnets, and there are effective means of controlling voltage in such a generator.

We look for these developments to

ed and built by . . .

UNITED®

HIGH SPEED
5-STAND
TANDEM COLD MILL

UNITED

ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Pittsburgh, Vanderbilt, Youngstown,
Canton, Wilmington

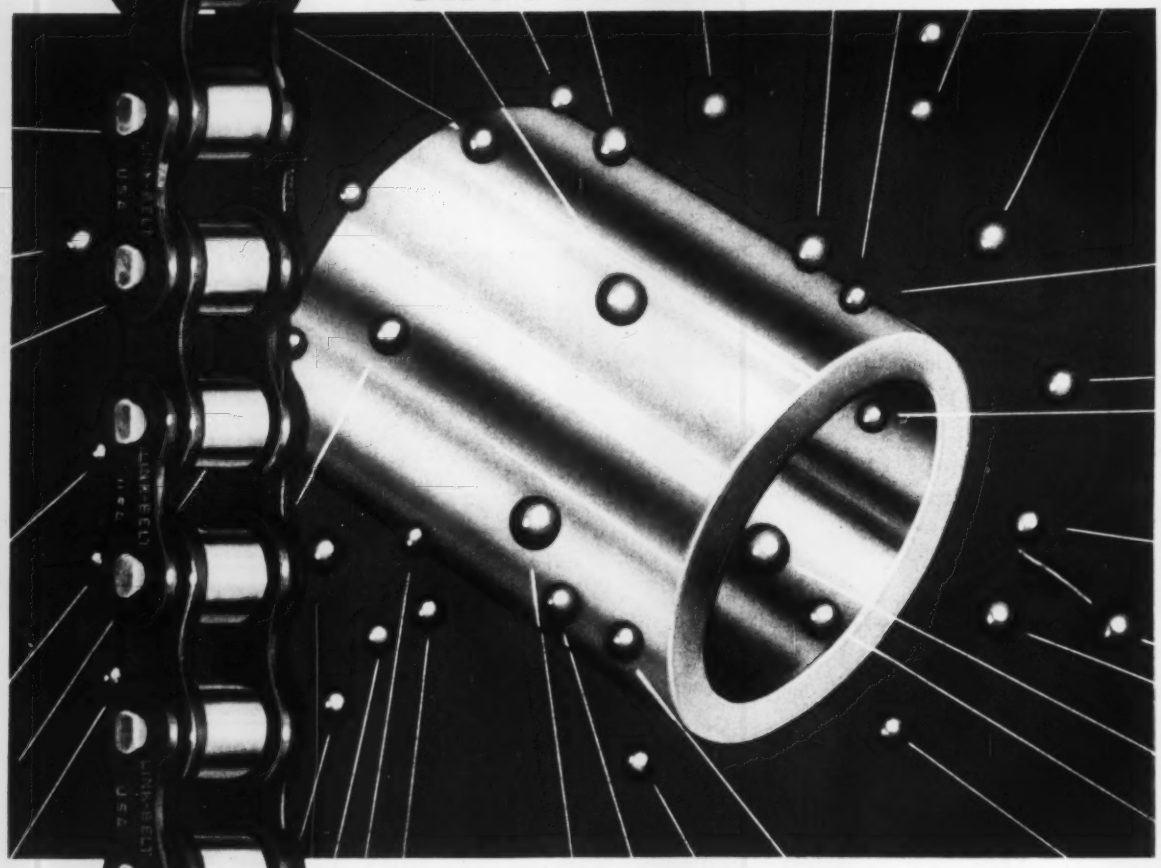
SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

Shining example of "extra" chain quality

SILVER-BRITE

SHOT-PEENED ROLLERS

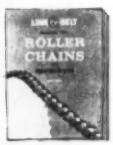


EXTRA LIFE IS POUNDED IN AND NOT POLISHED OUT

Rollers for Link-Belt precision steel roller chain are now finished by a special burnishing process to a "Silver-Brite" luster! And this is accomplished *without grinding away the benefits imparted by shot-peening*—a Link-Belt process that cold works the metal and provides extra fatigue life.

Many more special Link-Belt "extras" contribute to the dynamic strength so important for today's heavy loads and high speeds: close heat-treat control . . . lock-type bushings . . . pitch hole preparation . . . pre-stressing.

Ask your Link-Belt office or authorized stock-carrying distributor for new 154-page Catalog 2657—the most complete roller chain data book ever compiled.



LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,976

Drives and Controls

FRANK H. FORD
Assistant Manager, Marketing Dept.
Turbo-Products Div., Clark Bros. Co.
Division of Dresser Operations Inc.
Olean, N. Y.

radically change the picture in such units as aircraft generators, engine driven generators, motor-generator sets, and other suitable applications. We can add supplementary excitation sources for motors and generators through the use of power transistors.

Ward-Leonard direct current motors have dominated adjustable speed drives for years. On the horizon are many varieties of alternating current, adjustable speed motors with superior characteristics. These motors combine the rotating element with the proper control circuit, using thyratrons, power transistors, and magnetic amplifiers to accomplish the required end. Progress in these units will be rapid.

In the next few years, we will have a gradual return to the all alternating current system. Light, high temperature, efficient, high speed, exciterless generators will deliver at any desired frequency to efficient adjustable speed alternating current motors. They will be accurately controlled to fit in the pattern of automation.

Use of Waste Heat Boosts Gas Turbine Efficiency

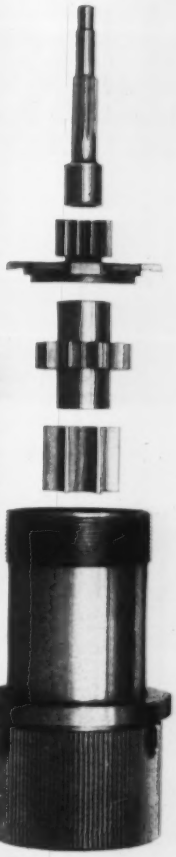
—FRANK H. FORD

• With improved materials and techniques, the gas turbine will become more important in the power picture.

Industry is beginning to realize the potential of the prime mover, particularly when the heat in the exhaust gas can be utilized. Such utilization increases the over-all plant efficiency, and many times (as in some process industries) provides the only economical means of obtaining the required plant steam and power balance.

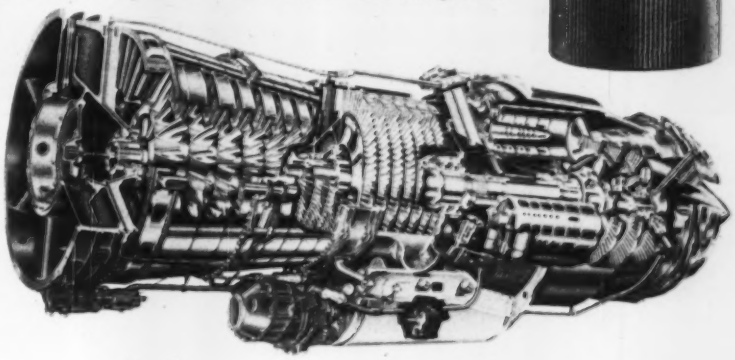
Exhaust gas heat has been used for a multitude of purposes, from heating and

PRECISION for top-flight performance!



Rigid PRATT & WHITNEY AIRCRAFT precision requirements spell *performance* . . . top-flight performance. Reason: The future is at stake. And that future can well ride on gear teeth. Since 1940, PRATT & WHITNEY AIRCRAFT gear tolerances have been *Perkins'* standards . . . for commercial gears as well as aircraft. Such precision pays off in longer wear, greater efficiency, lower maintenance cost. That type of precision can pay off for you, too.

Famous PRATT & WHITNEY AIRCRAFT J57 Jet Engine, power plant for Air Force "Snark" guided missile, is geared for both commercial and military performance by *Perkins*. Typical tolerances on *Perkins* gears: .0004 tooth to tooth; .0015 cumulative; .0005 on involute. On spline: .0006 tooth to tooth; .0008 cumulative; .0005 on involute. Most *Perkins* gears are carburized, hardened and ground.

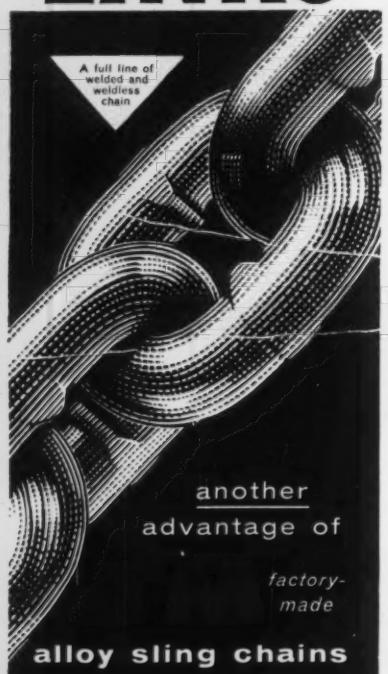


YOURS ON REQUEST Folder showing custom gears Perkins has made (from various materials) for aircraft, automotive, precision instruments, home appliances, portable and machine tools, and other products. Includes Perkins facilities for producing various gear types and sizes. *Write today.*

PERKINS
MACHINE AND GEAR CO.

Dept. 1G West Springfield, Mass.
Telephone: REpublic 7-4751

STRESS FREE LINKS



another advantage of *factory-made*

alloy sling chains

All body links on every size of TM Alloy Chain are electrically flash-welded to form Taylor's exclusive, stress-free links. This method, plus controlled heat-treatment, removes all stress — insures maximum strength and safety. Tayco Hooks . . . Taylor's quality control and Test Certificate are other advantages. Get all the facts. Call your distributor or write for Bulletin 13.

S. G. TAYLOR CHAIN COMPANY, INC.
Hammond, Indiana
3505 Smallman St., Pittsburgh, Pa.

Taylor Made CHAIN SINCE 1873

Drives and Controls

ROBERT O. GEE
Manager of Application Engineering
Reliance Electric & Engineering Co.
Cleveland

drying to absorption type refrigeration.

Gas turbines are being used as the sole power source for complete industrial and process plants, where the entire output of the operation depends on their reliability.

Look for More Automation of Handling, Process Controls

—ROBERT O. GEE

• General automation practices are on the increase. Look for more conveyors with automatic controls to carry materials through the manufacturing process.

Automatic process controls are coming into their own. Any measurable process variable—tension, speed, pressure, fluid flow, pH, temperature—can be translated into electrical signals, amplified, and fed into special controls that are being built. The controls will then automatically govern the performance of single or multiple processes. The advantages: Greater production speed, consistent product quality.

The producer likes it because it saves him the bother of slitting, cutting, sorting, and shipping by box. The customer likes it because he gets his order faster in coil form.

Even more savings can be realized by data logging. Tapes will be used to control line speeds and screwdown pressures.

You'll have more space in your plant for operating machinery due to smaller drives and motor controls. New insulation and ventilation have allowed us to package standard, rotating motor controls into cabinets 35 per cent smaller than previous units of the same rating.

Small, compact control cabinets and new enclosures for motors and controls permit putting the control units at or near the process lines. That approach eliminates long conduit or bus duct runs, and separate rooms or excavations for control units and motor-generator sets.

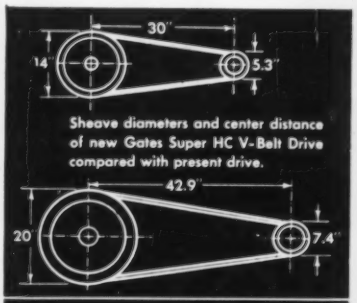
How savings multiply with new Gates Super HC V-Belt Drive

The cost of a new Gates Super HC V-Belt Drive is as much as 20% less than the cost of a drive of comparable hp using present V-belts. But the lower cost of the drive itself is only the initial *purchasing* economy.

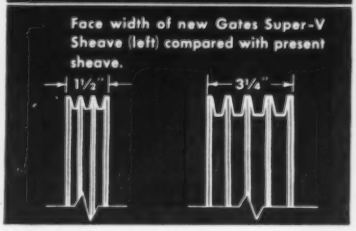
Further economies are realized on drive equipment, such as housings and bases — economies in materials, production time, shipping costs.

Shown below are space savings of a typical installation . . .

	Present Drive	Super HC Drive
DriveR Sheave	7.4	5.3
DriveN Sheave	20.0	14.0
Center Distance	42.9	30.0
Belts	4-B128	3-3V900



Sheave diameters and center distance of new Gates Super HC V-Belt Drive compared with present drive.



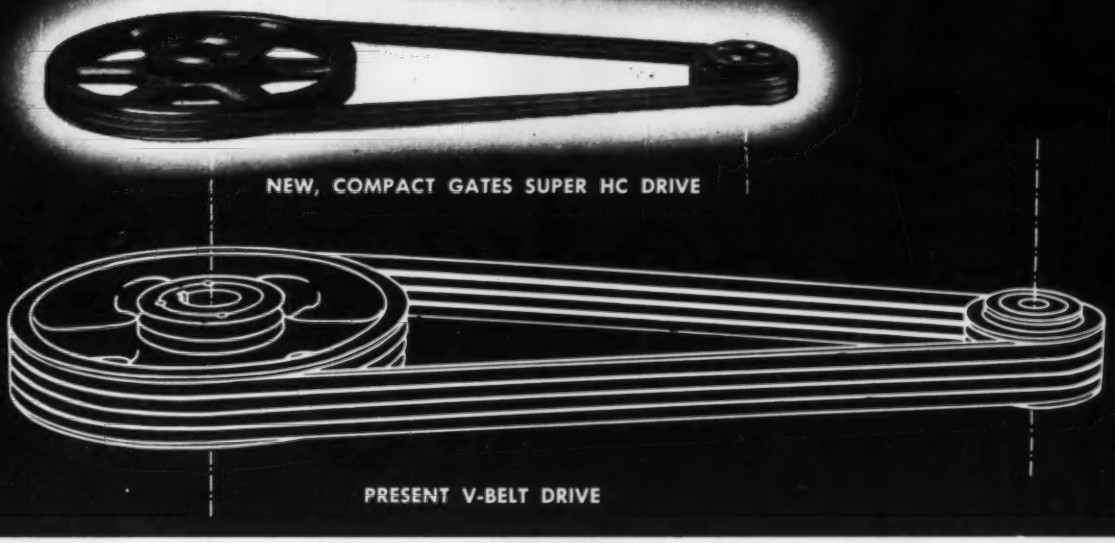
Face width of new Gates Super-V Sheave (left) compared with present sheave.

Super HC V-Belts also have these important Gates features...

1. **Flex-Weave Cover** (U. S. Pat. 2519590) A Gates exclusive. Makes cover more flexible . . . prolongs belt life.
2. **Concave Sidewalls** (U. S. Pat. 1813698) become straight as belt bends insuring uniform contact with sides of groove. Uniform contact means less wear . . . far longer belt life.
3. **High Electrical Conductivity** is built in for safer drives in explosive atmospheres.
4. **Oil, Heat and Weather Resistance** is insured by use of special rubber compounds.

Gates

New high capacity V-belt revolutionizes drive design



Makes drives far more compact... cuts cost as much as 20%

Here is a major advance in the field of power transmission — the fully proved Gates Super HC V-Belt, developed in the world's largest belt-testing laboratories at The Gates Rubber Company.

With the Gates Super HC V-Belt, you can have the lowest-cost, lightest-weight, most compact multiple V-belt drive you can put on any machine! Sheave diameters can be reduced up to 50%, sheave widths 30% to 50%, center distances 20% and more!

On new drives, the cost of a Gates Super HC V-Belt Drive is as much as 20% less than present V-belt drives of the same hp capacity!

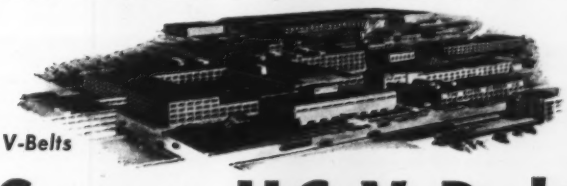
Learn More About The Cost-Saving Super HC Drive

For detailed information on the Super HC Drive, contact your nearby Gates distributor or Gates Office for new booklet, "*The Modern Way to Design Multiple V-Belt Drives.*" For utmost space, weight and dollar savings in new drives or drive replacements, specify Gates Super HC V-Belts and Sheaves. Stocks immediately available in principal industrial centers.

The Gates Rubber Company Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates

World's Largest Maker of V-Belts

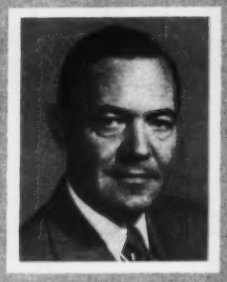


Gates Super HC V-Belt Drives

JOSEPH P. CROSBY
Vice President-Sales
Lapointe Machine Tool Co.
Hudson, Mass.

HENRY P. CHAPLIN
President
Cone Automatic Machine Co. Inc.
Windsor, Vt.

MARVIN R. ANDERSON
President
Michigan Tool Co.
Detroit



ROBERT W. HANCOCK
President
Hancock Industries Inc.
Jackson, Mich.

1959 FORUM ON TECHNICAL PROGRESS

Machining

Broaching Gets Ready For 'Soaring Sixties'

—JOSEPH P. CROSBY

• In 1959, the threshold year, broaching will lead the way for the next decade's new developments in machining of metals. In a recent survey, it was shown that broaching machines had improved their productivity more than any other machine tool in the industry.

This year, manufacturers will look for the machine tool that can give them the highest productivity at lowest cost.

Advances in electromechanical, horizontal, vertical, and continuous, high speed broaching machines (adaptable for carbide broaches) will have tremendous impact. Today's machines have built-in automation and repetitive accuracy; they handle most of the exotic metals now being used.

Design Changes in Automatics Needed To Reduce Downtime

—HENRY P. CHAPLIN

• Users of multiple spindle automatics will continue to seek means of reducing production costs. It is equally certain that in machine selection they will not overlook values that lessen downtime in these main categories: Job change, perishable tool change, stock loading, lubrication, and other machine maintenance.

It is not logical to expect the total requirements to be effectively met by only a few models. Effective job change facility must start with machine design. In addition to the usual job change features, there is need of better established reference points on machines to facilitate faster and more accurate location of tools and toolholders. Machine maintenance is also considerably dependent on machine design, particularly as it affects accessibility of replaceable parts and quality control in the machine's manufacture.

Two other downtime reducing provisions are: A controlled method of preset, quick change tooling, and a continuous type of stock feed. More self-loading bar stock reels, some of which load from the side to permit the use of extra long bars, may also be expected.

Problem of Productivity Sparks Process Development

—MARVIN R. ANDERSON

• Metalworking's basic problem will continue to be greater productivity to keep prices in line and compensate for still-rising labor costs.

The recession-imposed curb on capital investment brought several cost-saving methods into sharp focus, including development of more productive processes, the automating of existing machines, and increased emphasis on tool convertibility and salvage. In spite of today's improving industrial climate, such developments will continue to attract attention.

The upsurge in research and development activities will continue. Not only new processes but improvements in already accepted ones will result. A good example of this is our process for gear forming by cold displacement of metal. Recent research projects indicate even wider applications of the process by adapting it to hot forming and small-run roll forming.

Automation, too, will go on unabated but in a somewhat different fashion. Output is no longer the main requirement. Flexibility and high precision will be given increased consideration. Look for automation to be aimed at product families rather than single-product types. Automation in-process gaging is also expected to become increasingly important.

Cutting Nonproductive Time Opens New Equipment Field

—ROBERT W. HANCOCK

• Increased attention is being given to eliminating all possible nonproductive costs. Among these: Unnecessary downtime with accompanying idle time of both

RALPH J. KRAUT
President
Giddings & Lewis Machine Tool Co.
Fond du Lac, Wis.

D. E. HAWKINSON
Vice President
Greenlee Bros. & Co.
Rockford, Ill.

H. GLEN BIXBY
President
Ex-Cell-O Corp.
Detroit

HOWARD N. MAYNARD
President
Snyder Corp.
Detroit

machines and men, excessive supervisory costs, inefficient use of maintenance and setup personnel, excessive time and paperwork required in timekeeping, and inefficient production planning and control.

The record shows that the ratio of nonproductive to direct production labor costs has been rising at a fast rate in practically every industry. In some cases, the ratio has more than doubled in the last decade. Lack of attention to unproductive labor costs is one of the reasons why anticipated increases in over-all plant productivity have not materialized. Certainly, over-all productivity improvement has not kept pace with expanding capacity to produce.

We had to devise our own equipment to enable us to make more efficient use of both our personnel and equipment. The savings have been enormous. In less than a year of operation the equipment more than repaid its entire cost, and the savings are still growing.

In addition, the interest in what we had accomplished through simple and low cost communications and centralized control equipment became so intense that we were practically forced into establishing a separate division (Telecontrol Div.) to make similar equipment available to other companies.

Future Looks Bright For Numerical Control

—RALPH J. KRAUT

• There are a lot of bright spots in the future for builders who have followed a sound practice of new product development, personnel training, and upgrading of manufacturing facilities.

Many new processes and products, such as chipless shaping, rolling of splines and gears, Flo-turning, precision casting, sintered casting, electric discharge and electrochemical machining, and numerically controlled machines are coming into being.

We are especially bullish on the future of numerical control. Few people have realized the real meaning of this breakthrough. As in all new processes, the maximum benefit accrues by a redesign of the product to fit the manufacturing process. A whole new family of cutting tools will be generated by numerically controlled machining and automatic tool changing. Tools that cut longer, hold size closer, and can be readjusted to diameter and axial interchangeability after sharpening will be necessary. Some throwaway tool systems will be found economical.

Tool Builders Meet Challenge Of New Materials, Processes

—D. E. HAWKINSON

• Industry will move forward in 1959 with a great variety of new products, all designed to take advantage of new materials and processes perfected during the pause of the last several years.

New alloys and techniques will spur the use of aluminum diecastings and extrusions for a great number of functional parts. Cast to close tolerances and replacing ferrous castings and forgings, these parts will have a decided impact upon the machine tool industry. Methods of locating, handling, and machining this type of part must be carefully studied by the machine tool designer.

On many parts, the one-time dream of automation from molten metal to finished part could be a reality in the near future.

Flexibility Cited as Must in Extending Automation Market

—H. GLEN BIXBY

• The news in automation is increased flexibility. Some of the first automated machines were single-purpose specials that turned into white elephants as soon as their original purpose was fulfilled. That doesn't happen now because automated production lines are composed substantially of standard units that can be rearranged again and again for part changes or for accommodating new parts. We are confident that this flexibility is a feature that will help us sell automated machines to businesses that otherwise would not consider them. Production in most industries cannot and need not justify the expenditure required for a machine that might be good for only a couple of years. Our market for automation will grow in relation to the adaptability we can build into our automated machines.

What about numerical control? We believe its use will expand rapidly within well-defined areas. It offers few advantages in mass production as we think of it in the automotive, refrigeration, or electrical industries, but it will be useful in making dies, cams, tooling, and prototypes in these industries. It will find increasing use in aircraft production, where large, complicated, and expensive jigs and fixtures can be replaced by compact rolls of tape that are easy to handle and easy to store.

Numerical control will not replace tracer or cam controlled machines, but will make the tracer template and cams at a fraction of their former cost and to the highest degree of accuracy. Complicated prototype parts will be made by numerically controlled machines without the use of special tooling and highly skilled operators.

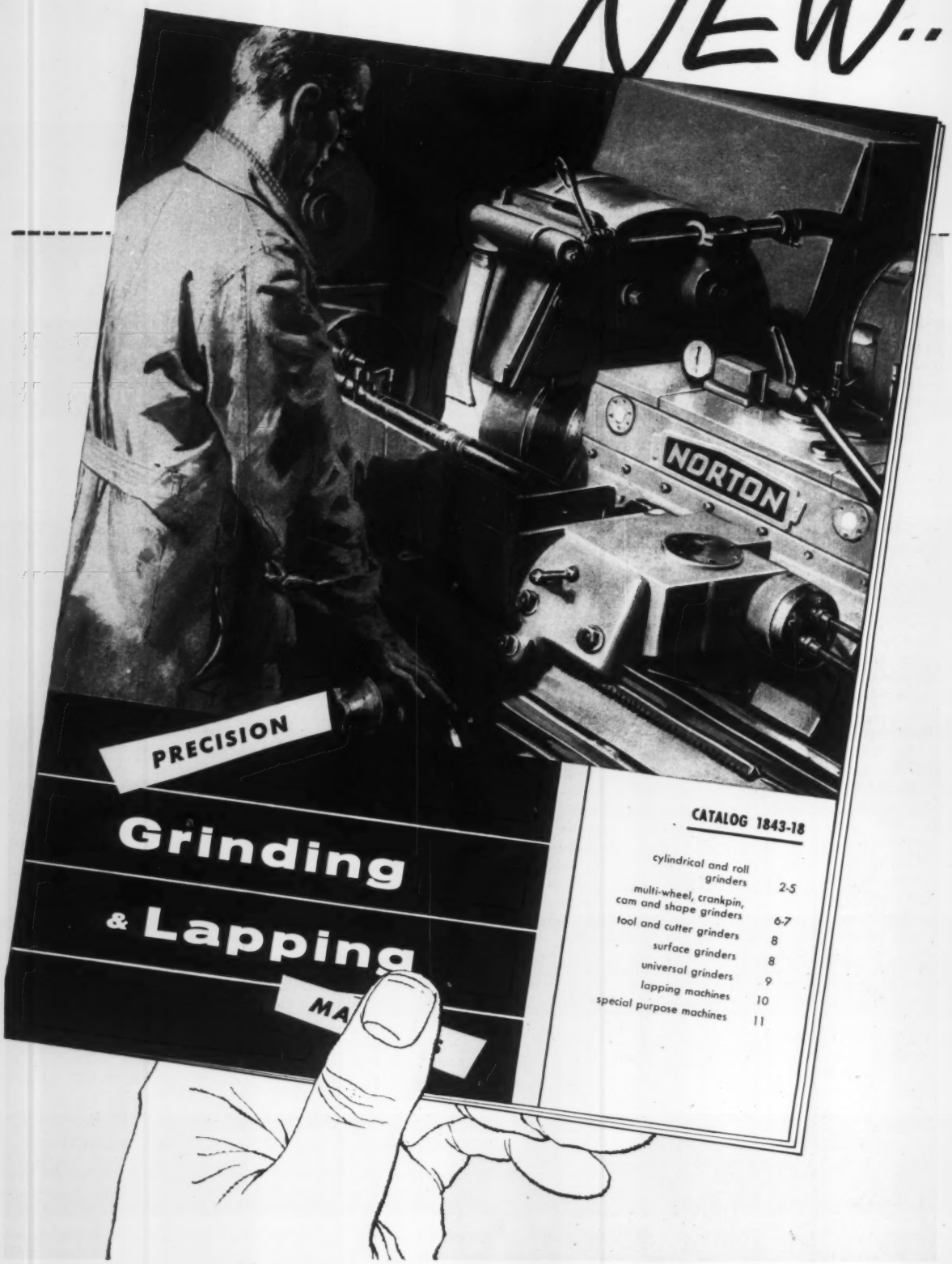
Combination-Operation Specials Answer Cry for Flexibility

—HOWARD N. MAYNARD

• Since World War II, the addition of new production equipment and processes has enabled industry to temper some-

(*Please turn to Page* 298)

NEW..


NORTON
PRECISION
Grinding
& Lapping
CATALOG 1843-18
cylindrical and roll grinders 2-5
multi-wheel, crankpin, cam and shape grinders 6-7
tool and cutter grinders 8
surface grinders 8
universal grinders 9
lapping machines 10
special purpose machines 11

. . . Get this latest catalog of

MACHINES ENGINEERED TO HELP YOU MEET COMPETITION

Norton Catalog No. 1843-18 — just published — describes and illustrates the world's most complete, most modern line of grinders and lappers. This includes cylindricals, angulars, surface, universals, tool and cutter, flat and cylindrical lappers and special types of machines for grinding pistons, valves, jet parts, etc. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to bring you the "Touch of Gold" that helps you produce more at lower cost.

Get a free catalog from your Norton Representative. He'll also be glad to tell you about Norton Leasing and Financing Plans, that enable you to modernize while conserving capital. Or, for your catalog or any information, write direct to NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

NORTON MACHINE DIVISION REPRESENTATIVES

ALABAMA
The Young & Vann Supply Co.
1725 First Avenue, Birmingham 2

CALIFORNIA
Moore Machinery Co.
7th and Carleton Streets, Berkeley 10
Moore Machinery Co.
3200 S. Garfield Avenue, Los Angeles 22
Moore Machinery Co.
656 Stockton Avenue, San Jose 26

COLORADO
Mine & Smelter Supply Co.
P.O. Box 9041, Denver 16

CONNECTICUT
Rudel Machinery Co.
7 South Main Street, West Hartford 7

FLORIDA
Harry P. Leu, Inc., 100 W. Livingston Ave., Orlando
Harry P. Leu, Inc., 3701 N.W. 37th Ave., Miami 42

ILLINOIS
Marshall & Huschart Machinery Co.
571 Washington Blvd. at Jefferson, Chicago 6

INDIANA
G. A. Richey & Sons
1050 Broad Ripple Avenue, Indianapolis 20

LOUISIANA
Stauss & Haas, 524 Camp St., New Orleans 12
Peerless Supply Co., Inc.
701 Spring Street, Shreveport

MICHIGAN
Motch & Merryweather Machinery Co.
23520 Woodward Ave., Detroit 20 (Ferndale)

MISSOURI
English Brothers Machinery Co.
410 West Fifth Street, Kansas City 6
Blackman & Nuetzel Machinery Co.
3713 Washington Avenue, St. Louis 8

MINNESOTA
The Satterlee Co.
2200 East Franklin Avenue, Minneapolis 4

NEBRASKA
Interstate Machinery & Supply Company
1008 Douglas Street, Omaha 8

NEW YORK
Rudel Machinery Co.
1807 Elmwood Avenue, Buffalo 7
Rudel Machinery Co.
100 E. 42nd Street, New York 17
Schiefer-Philipp Machinery Corp.
39 State Street, Rochester 14
J. F. Owens Machinery Co.
1810 Erie Boulevard, East, Syracuse 1

NORTH and SOUTH CAROLINA
Jeffreys Engineering & Equipment Co.
Guilford Building, Greensboro, North Carolina

OHIO
Motch & Merryweather Machinery Co.
Kenwood & Montgomery Roads
Cincinnati 36
Motch & Merryweather Machinery Co.
1250 E. 222 Street
Cleveland 17
Motch & Merryweather Machinery Co.
1305 American Building, Dayton

To Economize, Modernize with **NEW**

NORTON

GRINDERS and LAPPERS

OREGON
Harry M. Euler Company
2811 N.E. Glisan Street, Portland 12

PENNSYLVANIA
Machinery Associates, Inc.
325 East Lancaster Ave.
Wynnewood (Philadelphia Area)
Motch & Merryweather Machinery Co.
1315 Clark Building, Pittsburgh 22

TEXAS
Greene Machinery Co.
6300 Wyche Boulevard, Dallas
Mine & Smelter Supply Company
1515 11th Street, El Paso
Steel & Machine Tool Sales Company
P.O. Box 1716, Houston 1

UTAH
Mine & Smelter Supply Company
121 West Second, South, Salt Lake City 1

VIRGINIA
Noland Company
2700 Virginia Avenue, Newport News
Noland Company
1226 Center Avenue, N.W., Roanoke 1

WASHINGTON
Star Machinery Company
241 Lander Street, Seattle 4
Star Machinery Company
E. 415 Sprague Avenue, Spokane

WASHINGTON, D.C.
Machinery Associates, Inc.
325 East Lancaster Ave., Wynnewood, Pa.

HAWAII
Honolulu Iron Works Company
Territory of Hawaii, Honolulu
New York Office, 165 Broadway, New York 7

EXPORT:
Norton Behr-Manning Overseas Inc.
Worcester 6, Mass., U. S. A.
Cable Address: NORBEMO, Worcester
Representatives in all principal cities of the world

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

District Offices: Worcester • Hartford • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

Machining

WALTER K. BAILEY
President
Warner & Swasey Co.
Cleveland

ALAN C. MATTISON
President
Mattison Machine Works
Rockford, Ill.

H. C. DAUM
Manager, Machining Process Dept.
Ford Motor Co.
Dearborn, Mich.

what the product price increases resulting from continually increasing labor costs. This trend is one that a manufacturer must continue to stay in business.

There are still many areas in metalworking production where costs can be cut by installing new and improved types of specialized machine tools. Example: The railroad industry cut costs by modernizing its machining processes.

Combination-operation special machines usually offer metalworking plants the most significant savings today. Special machines now being quoted and built fall mainly in this category.

The basic designs and components for these specials, such as rotary index and center column types, have been developed and proved by builders. These machines can economically handle a variety of parts and thus can be easily adapted to meet the production needs of manufacturers in the small lot and medium production ranges.

Most machine tool builders agree that the automotive industry now has adequate transfer-type machine tools to meet their requirements within their present product design concepts. Unless designs are drastically changed, it seems reasonable to assume that most of the transfer machine construction in 1959 will be in the area of rebuilding to meet more or less minor design changes. The majority of these transfer machines are of combination unit construction and can be economically rebuilt.

Two Challenges Spur Machine Developments

—WALTER K. BAILEY

• Two major factors are accelerating invention and product development in the U. S. machine tool industry: First, the imperative need in metalworking to offset higher wages by reducing production costs. Second, the competition of lower priced, European built machine tools.

It is generally assumed that the most significant progress will be made in numerical control. The machine tool industry is working diligently to bring the cost of numerical controls down to levels of broad, practical use.

The price problem presented by imports is important, of course; but it is nothing new. American machine tools have always cost more than comparable foreign makes. But people have preferred American machines because they outranked foreign machines in design and performance. But many of today's foreign machines are coming dangerously close to ours in those areas. To maintain our advantage, we must again outengineer and outdesign our foreign competition.

Surface Grinding Aims To Boost Part Quality

—ALAN C. MATTISON

• Surface grinding has made notable advances as a metal removal method, partly because of technological developments and partly because more production men have learned to apply it.

Power-tilting spindles for rotary surface grinders—together with improved wheel bonding, higher horsepower spindle motors, high machine rigidity, and continuous downfeed—present a package that combines grinding's inherent accuracy with sizable production capacity.

The quick-tilt spindle development permits optimum stock removal characteristics to be combined with outstanding accuracies and finishes. A 50 per cent production improvement can be attained on average grinding jobs just by tilting the spindle 0.010 in. for the roughing pass, then returning the spindle perpendicular to the work for a fast finish grind before sparking out. Tilting and resetting are handled quickly by pushbutton actuation at the pendant control station.

The contact area between the wheel segments and the workpiece is reduced by tilting the spindle. Because all the horsepower is applied to this reduced contact area, grain penetration and chip size are increased. To keep the wheel self-dressing, high downfeeds are used. The completed workpiece is dead flat and has a perfect crosshatch. Best of all, the cost is lower than that formerly paid for either stock removal or finishing.

Abrasive belt grinding is another area where we have recorded considerable progress recently. Single-pass grinding, size control, higher belt speeds, longer belts providing greater cooling, and new roll designs permit outstanding finishes on work ranging from small flat parts to stainless steel sheets.

Look for Standards in Specs On New Machine Tool Orders

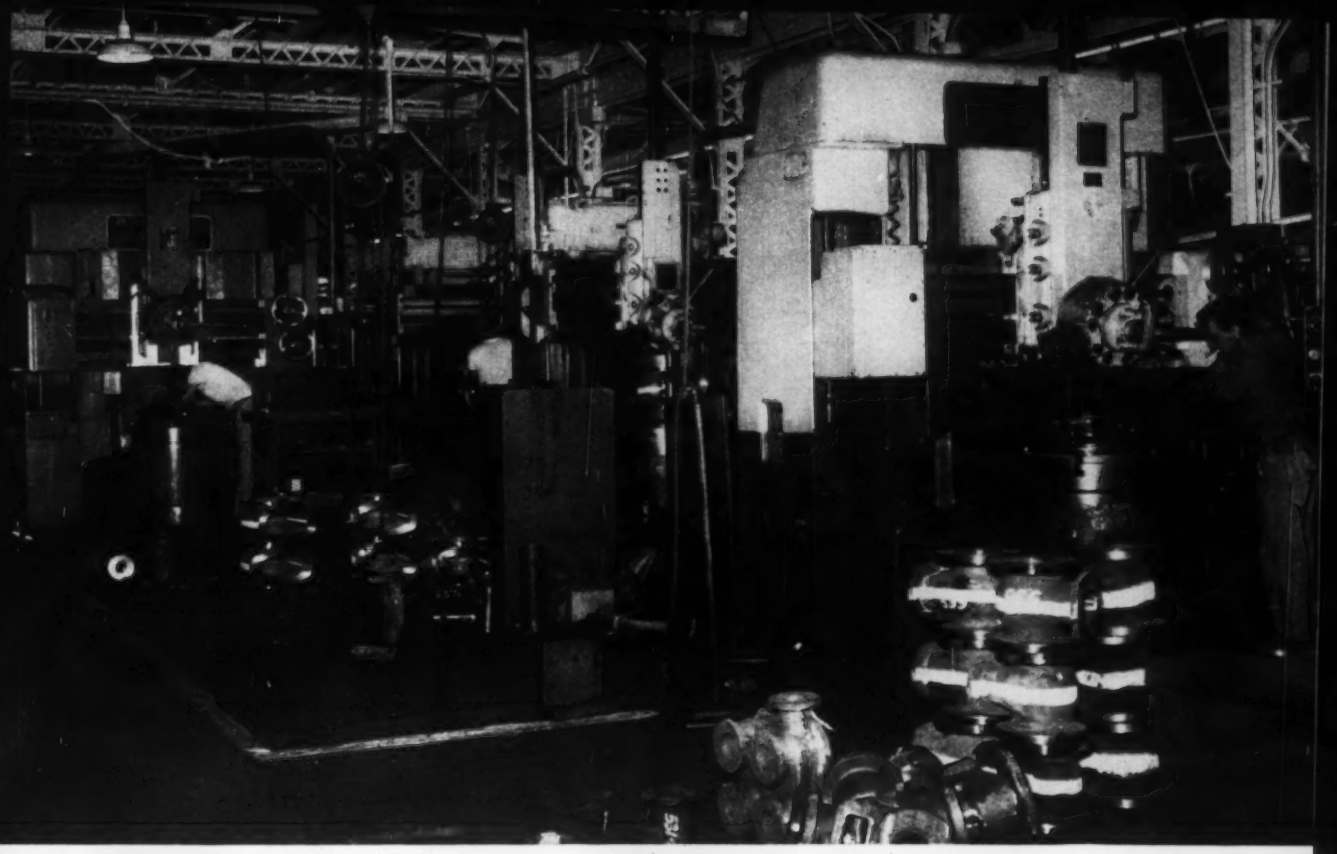
—H. C. DAUM

• A significant stimulus to continuing prosperous business activity for an extended period is the trend in industry to introduce new products and new model changes on an accelerated basis. Recurring changes in materials, processes, and products are a challenge to inflexible manufacturing facilities. To meet this challenge, increased flexibility must be provided by the machine tool and equipment industries to reduce the time needed to get into production.

A trend to flexible facility complements is the development of industry-wide standards for special production machine tools.

During the early part of this year, the automotive industry and other users of production type machines will propose that the mounting and attaching surfaces, location methods, and bolting patterns of certain components and units be standardized to permit interchangeability among various types of production machine tools. This proposal includes standards for special in-line transfer-type machines, special rotary index or dial-type machines, and special way-type horizontal and vertical machines. The standards contained in the users' proposal

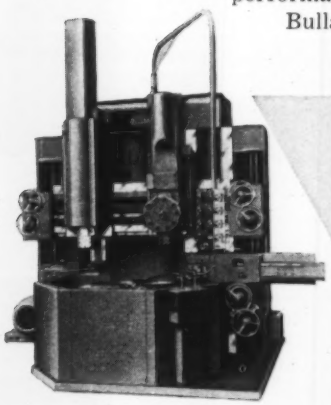
(*Please turn to Page 302*)



"they're GOOD machines"

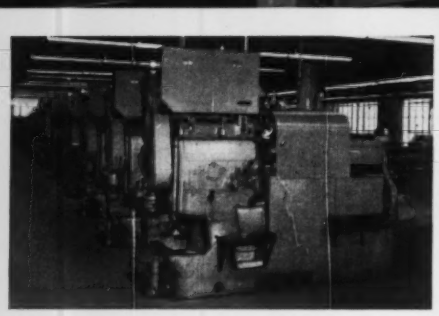
A veteran of 39 years with the Newport News Shipbuilding and Drydock Company, Mr. L. G. Webb, Foreman, further said "a large volume of valve bodies, hubs or levers for hydraulic turbines and various other parts to be machined are handled most efficiently on our Bullard Model 75 Vertical Turret Lathes." Replacing Bullard V.T.L.'s of an earlier design, which gave them excellent performance, this company has a battery of ten Bullard Cut Masters, Model 75, ranging in size from 26" to 66".

BULLARD



The same dependable day-in and day-out cost cutting performance delivered by Bullard Cut Master V.T.L.'s, Model 75, can be applied to your machining work — have a Bullard Sales Engineer show you the many benefits of replacing your outdated equipment.

THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT



One of a bank of 9/16" RA-6 spindle Acme-Gridley automatics installed at Gillette's Boston, Mass. plant

Close up of tooling zone showing adjusting knob in 5th position

Precisely Formed, Marked, Knurled,

Broached, Micro-finished, Reamed and Tapped . . .

ON ONE ACME-GRIDLEY AUTOMATIC

in *4½ Seconds!*

The adjusting knob on this new adjustable razor is but one of its several precision components made by The Gillette Safety Razor Company on 5/16" Acme-Gridley six spindle bar automatics. The requirements were extremely exacting, *with as many operations as possible performed in the primary setup!*

For example: nine positions are stenciled on a turned portion of the O. D. with interrupted knurling held in exact peripheral location to the marking. In addition, close tolerance hole sizes are involved and *all* external burrs completely removed. All tools had to be synchronized to produce the exacting number-knurl relationship on the periphery.

Working in close cooperation with Gillette engineers, National Acme specialists took full advantage of the wide-open tooling zone, independently operated tool slides and the extreme accuracy and flexibility of direct camming . . . to perform an ingenious job of tooling. Many operations normally considered "secondary" were accomplished in the primary setup. Costly rehandling and "second machine investments" were reduced.

Write or ask one of our representatives for the complete story on the industry's most modern approach to *your* cost reduction problem.

Pioneer in Circumferential Automation

National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

Machining

GEORGE H. JOHNSON
President
Gisholt Machine Co.
Madison, Wis.

J. F. ALLEN
Manager, Missile Plant
Cameron Iron Works
Houston

RALPH E. CROSS
Executive Vice President
Cross Co.
Detroit

WALTER S. PRAEG
President
National Broach & Machine Co.
Detroit

probably will be specified on new procurement during 1959.

Another step in standardization will be the development of standard mounting surfaces and location methods for so-called standard machines to permit the interchange of jigs and fixtures between like machines of different manufacture.

Machine Controls Boost Short Lot Efficiency

—GEORGE H. JOHNSON

• Continued development and increased application of recorded-information controls will lead the trend toward more automatic and easier-to-operate machine tools. The possibilities of cost reduction in small lot production, via the elimination of special tooling and templates, reduction in setup time, and lowered scrap loss, are definitely appealing.

But numerical control of some machines may not meet the claims made. When all factors are considered, small lot production costs of turret lathe work, for example, can be considerably less with present methods than with a complicated tape controlled machine. Automatic turret lathe operation from recorded data without an operator, setup man, or technician in the picture is still not feasible. Someone must set the tools, check the controls, observe the results, and make periodic adjustments. Preparation of the necessary information and its recording in proper form require valuable time of specially trained people.

Improved controls on automatic turret lathes permit setting up a complete automatic cycle by merely positioning a set of toggle switches and setting a few potentiometer knobs. In many cases, a setup can be made in little more time than would be required on a tape controlled machine, and the setup man does not need to be an electronic engineer.

Better Tooling Needed For Present Equipment

—J. F. ALLEN

• The manufacturing division of any company must concern itself with but one objective: To attain the optimum balance between the material, labor, and overhead costs that go into its product.

In prosperous years, the modernization of plant operations is not particularly difficult. But last year we saw the postponement of many such programs because of the lack of capital.

As a result, attention is being focused on better tooling for present equipment. A few thousand dollars spent on special tooling, such as air operated indexing fixtures or cam operated slide tools, can put new and amazing capabilities into a machine tool which might otherwise be considered obsolete.

New products always present new problems. For example, consider the problem of forming and machining a large and relatively flimsy rocket motor casing to which various pieces of missile hardware must be mated and where tolerances representing less than 1/100 of 1 per cent of basic dimensions must often be held. Roundness and size requirements can be met with explosive forming, which virtually eliminates the problem of springback. Heavy steady rest rings can be mounted on the part (without introducing distortion) with a low melting point alloy.

After they have served the purpose, they can be removed in a bath of hot water which melts the bonding alloy.

Automation Aims At Flexibility

—RALPH E. CROSS

• Greater flexibility and higher operating efficiencies continue to be our goals for the immediate future.

We are now providing our customer with automated machines that will process a complete product line of parts with all the variables. For example, we recently installed a group of transfer machines for processing a new line of aluminum transmission cases. Four different cases move through the different machines as schedules dictate. Standby tools are provided to handle the part variations and are automatically brought into operation as required.

Depending on the work, parts bypass some stations and pick up others. The end result is maximum flexibility for a given product mix, minimum investment of work in process, minimum floor space, and minimum capital investment.

Last year, we introduced a new electronic device which automatically stops a machine if a tool is broken. It reduces downtime and salvage operations by eliminating the production of needless scrap parts due to broken tools.

Gear Tooth Broaching To Make Further Strides During Year

—WALTER S. PRAEG

• New developments in broaching are pointing the way to further cost reduction possibilities for metalworking plants. The new external helical gear broaching process, in which gear teeth are produced by twisting a gear blank while it is being pushed through a hollow broach on a simple vertical hydraulic press, is being applied successfully on cast iron gears. The process is fast, extremely accurate, and produces teeth of excellent surface finish.

Another significant development in broaching, which will be announced dur-

Sam: this may solve transmission problems.

GREENLEE

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines
- Core Box Rollover and Draw Machines

GREENLEE OFFERS . . .

COOPERATION FOR AUTOMATIC PRODUCTION

The emphasis is on cooperation at Greenlee. Your ideas are added to Greenlee's. One idea sparks another. The result . . . the creation of machines that will meet your requirements efficiently . . . economically . . . now and in the future. Top-flight Greenlee engineers help you avoid costly mistakes. Their thinking is sound . . . respected. Call Greenlee. Let them give you the complete story on cooperation for automatic production.

MACHINES DESIGNED WITH THE FUTURE IN MIND

GREENLEE BROS. & CO.

1746 MASON AVENUE
ROCKFORD, ILLINOIS

Joe: these people have a lot of machines in Detroit Look them over and let me have your reaction - Sam

(Advertisement)

35 complex impeller blades are profiled from the solid with this custom-built milling machine. Machining involves compound curvatures, thicknesses and depths. *Cost per piece was reduced from $1,280 to $141.

Machining Cost Reduced 89% with Custom Designed Tools

Critical and growing need for cost reduction in machining complicated parts requires machines tailored to the job.

In this period of increasing complexity of design of many parts and components and during the present evolution of harder, tougher alloys, management and methods men are being compelled to search far and wide for tools more suited to their needs than so-called standard types. In fact, the selection of specially designed tools is indicated more and more since it often goes to the heart of reducing costs all along the line.

As a case in point, the machine illustrated above paid for itself in less than two months. Production time per piece was reduced from 100 hours to 11 hours.

The machine illustrated was designed by the pioneer in the field of tracer control; it is just one of many manufactured by this machine tool builder which employ hydraulic or electronic tracers or which operate from punched cards, punched tape or magnetic tape to meet the exacting demands now present in the metal cutting field.

You may have a part or problem involving cost reduction productivity, accuracy or finish. If so, you will find it worthwhile to write the George Gorton Machine Co., 2001 Racine Street, Racine, Wisconsin.

Immediate attention and prompt analysis of your requirements will be provided without obligation.

**Above figures are based on operator cost of* $2.80 *per hour and machine hourly rate of* $10.00.

Machining

EVERETT M. HICKS
Vice President
Norton Co.
Worcester, Mass.

ing 1959, is a method of producing precision internal involute running gears and splines by a single operation utilizing a combination roughing and finishing broach. The finishing portion, which will outlast several roughing sections, utilizes a concept called full-form finishing. This concept, in its first application, has produced internal helical gears of excellent finish and accuracy and can be expected to find wide application for two reasons: 1. Cost savings from the elimination of the separate finish broaching operation. 2. The economy offered by a finishing section that can be used on successive broaches as the roughing portions wear out.

Gear tooth honing will enter its third year of application in 1959. Each year has seen this hard gear finishing process expand its acceptance by industry as an economical method to remove nicks and burrs from gear teeth and to provide sound level improvements resulting from minor corrections in tooth form and surface finish.

Automation May Require, Basically New Machines

—EVERETT M. HICKS

• Automation is maturing rapidly. We believe it will come of age in the sixties. Development of equipment to provide automatic operation at reasonable cost continues to be one of the greatest challenges the machine tool builder has faced.

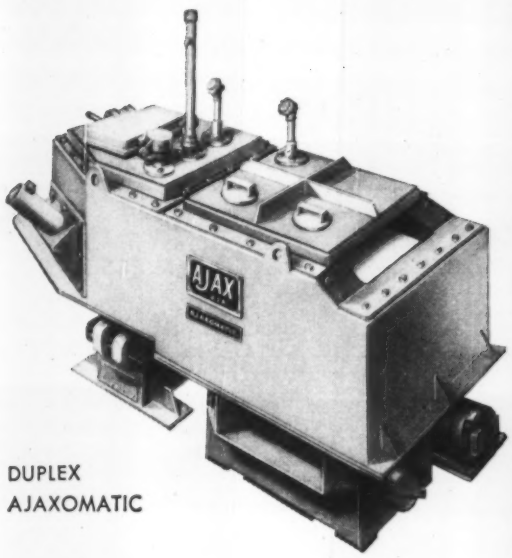
Many existing machine tool designs have incorporated more automatic features. They have simply been added, one after another, to a machine which was designed originally to be hand loaded and hand operated. The advent of fully automatic operation may require an entirely new basic design, planned to accommodate

(*Please turn to Page* 308)

CAN WE STILL AFFORD HAND-LADLING?

AJAXOMATICS

bring automation to die casting



DUPLEX
AJAXOMATIC

The Duplex AJAXOMATIC melts aluminum pig and gates right at the die casting machine. By pushing a button the operator initiates the complete casting cycle: the die closes and the Duplex AJAXOMATIC pours the exact required amount of molten metal directly into the cold chamber. The operator just removes the finished casting at the end of the cycle.

Automation, however, is only part of the AJAXOMATIC story. The Duplex AJAXOMATIC also gives assurance of consistent quality. The quality of a finished casting begins with the proper melting of the metal. 60 cycle induction with its two basic features of internal heating and electromagnetic stirring is used exclusively in the Duplex AJAXOMATIC. Here are the unique characteristics of the Duplex AJAXOMATIC:

Precision temperature control — at low temperature	No supply ladle system or hand ladles
Alloy uniformity — no segregation	Precise weight of automatic pour
No gas porosity	Comfortable working conditions
Low metal loss	Low maintenance

The standard Duplex AJAXOMATIC is rated 120 kw to produce 500 lbs per hour of castings ranging from ½ lb to 30 lbs. Other AJAXOMATICS are available to suit a wide range of production requirements, including units supplied from central melting systems. May we have an opportunity to study your requirements?

AJAX USA

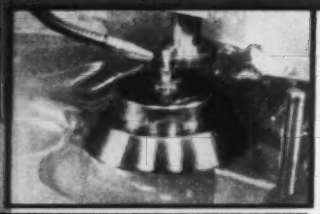
ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

60 CYCLE INDUCTION MELTING

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

FELLOWS GEAR

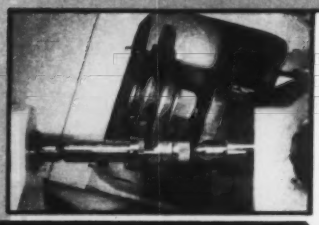


CUTTING

GEAR
external and internal

	3" FINE-PITCH	NO. 4GS	7-TYPE	7A-TYPE
Max. Pitch Diameter	3" ext., 2" int.	6"	7" spur*, 6-1/2" hel.	7"
Max. Diametral Pitch	40 steel, 30 brass	5/7 spur, 6 hel.	6 spur, 6/8 hel.	5/7 spur, 6 hel.
Max. Face Width	3/4"	2"	1-1/2" ext., 1" int.	2" ext., 1-1/2" int.
Max. Strokes Per Min.	2000	635	450	450

*Max. P.D. internal—5-1/2"



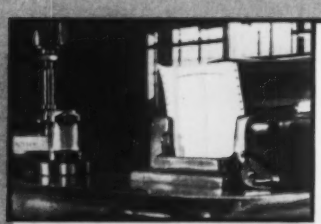
FINISHING

SHAVING MACHINES
spur and helical gears

GEAR GRINDER

	NO. 4 FINE-PITCH	NO. 8 "FULL-TOOL"	NO. 11 INTERNAL	NO. 12 FELLOWS REISHAUER
External & Internal	ext. only	yes	int. only	Spur and helical, max. O.D. 12". Max. face width, spur, 6-3/4"; helical: depends on pitch and helix angle. Pressure angles: 14-1/2° to 30°. Pitch ranges: 6 to 48 D.P. or 20 to 120 D.P.
Max. Pitch Diameter	4"	8"	***	
Max. Diametral Pitch	20	4	6	
Max. Face Width	1"	2-1/2"	1-1/2" up to 10P; 1" 12 to 16P	
Max. Spread of Centers	12"	**	***	

*Also 12", 18" and 24" machines for externals only. **Depends upon work-holding fixture. ***Depends upon design of gear.



INSPECTION

COMPOSITE CHECK
external and internal spur and helical gears.

INVOLUTE PROFILE CHECK

LEAD, CROWN & TAPER CHECK

	No. 4 Fine-Pitch RED LINER	No. 8M RED LINER	No. 20M RED LINER	No. 12M Involute Measuring	No. 12H Lead Measuring
Max. Pitch Diameter	4"	***	18"	12"	12"

Nos. 24M Involute and 24H Lead Measuring Instruments available with capacity of 24 inches. ***Depends upon design of gear

PRODUCTION EQUIPMENT

SHAPERS

spur and helical gears

	6A-TYPE	**No. 12**	**36-TYPE**	**120-INCH**
	18"	12"	36"	120"
	3/4 spur, 5/7 hel.	3/4 spur, 5/7 hel.	3 spur, 4/5 hel.	2 spur, 4 hel.
	5" ext., 3" int.	4"	6"	8"
	300	550	300	148

GEAR HOBBER

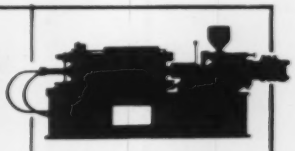
NO. 12GH2 HELIGUIDE

Spur and helical, max. O.D. 12". Max. face width, spur, 6"; helical, depends on helix angle and diameter. Max. diametral pitch 4. Hob speeds 123 to 430 R.P.M.

Also available: No. 10 Rotary Gear Shaper—10-spindle machine for very high production rates. Max. P.D. 12". Max. D.P. 3/4 spur, 5/7 helical. Max. face width 3". Max. cutting speed 500 strokes per minute.

FELLOWS injection molding equipment

Fellows Plastics Injection Molding Presses are the fastest fully-automatic machines in their capacity ranges. Sensitive, accurate, built-in controls assure fast, reject-free production with minimum operator attention.

			
	Model 3-125	**Model 6-200**	**Model 12-350**
Capacity	3 to 4-1/2 oz.	6 to 9 oz.	12 to 20 oz.
Pounds per hour	45	75	150
Cycles per hr. (dry run)	600 to 840	490 to 650	600 to 800
Max. mold size	12" x 17"	15" x 21"	20" x 33"

No. 4 FELLOWS COLD-FORMING MACHINE

Cold-works metal, ferrous or non-ferrous, to desired shape by kneading or plasticizing at room temperature. External shape is tubular, internal shape is determined by a mandrel. Maximum diameter of finished work: up to 4" O.D., depending on wall thickness. Maximum length of finished work: 20'.

Fellows also builds special-purpose machines for production of gears and other related items. Descriptive literature, technical data and price information on all types of equipment shown is available on request. Contact any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

THE PRECISION LINE

Fellows Gear Production Equipment

BROOK TOTALLY ENCLOSED, FAN COOLED, MOTOR DRIVES INCINERATOR DRAFT FAN.

An ideal application for this 30 HP Brook Totally Enclosed, Fan Cooled, Slip Ring Motor—built to resist heat or cold, dust, fumes, moisture. It is driving an induced draft fan handling washed flue gas and raw air at 350°F. in an American Incinerator Corp. system processing municipal waste. Brook A.C. Motors are winning praise in every industry for dependable service and overall economy. They can save for you! Warehouses, Sales Representatives, Dealers throughout the country. Send for literature.

Since 1904

world's most respected motor

BROOK MOTOR CORPORATION

3553 W. Peterson Ave., Chicago 45, Illinois
In Canada: BROOK ELECTRIC MOTORS OF CANADA, LTD. 250 University Ave., Toronto, Ontario

BROOK MOTOR CORPORATION

. . . for the right answer to your fastener problems

FULL LINE

Cap Screws, Carriage, Machine, Lag, Tap and Plow, Step-Elevator, Stove, High Strength, Anchor, Nylok, SpinLok, Place and Special Bolts

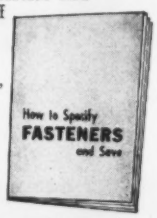
QUALITY IN QUANTITY

From billet to bolt, from our own rolling and wire drawing mills to final inspection — our fasteners are produced by modern equipment to closely controlled standards.

SERVICE

Two modern plants, Three convenient District Sales Offices, Specialized engineering service and an experienced field staff assure satisfaction for any requirement.

BOLTS AND NUTS



Write for brochure... "How To Specify Fasteners and Save"
Phone or write for our quotes on your fastener requirements.

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation
Plants: North Tonawanda, New York and Princeton, Illinois

DISTRICT SALES OFFICES

CHICAGO, ILLINOIS
1534-35 Monadnock Bldg.
HArrison 7-2178

NEW YORK CITY
50 Church Street
REctor 2-1888

NORTH TONAWANDA, N.Y.
101 East Avenue
JAckson 2400 (Buffalo)

Company Salesmen in all principal centers

Machining

E. H. H. GRAF
Vice President, Sales
Detroit Broach & Machine Co.
Rochester, Mich.

these automatic controls and work handling.

The continuing rise in wage rates will inevitably bring pressure to hold costs down by eliminating labor wherever possible. This means the sale of fully automatic equipment will continue to increase.

There is a need for the development of more reliable electronic systems which will allow the advanced developments in aircraft, missiles, and computer production to be applied to machine tools. Electronic systems have the great advantage of flexibility, but the original investment, the maintenance problem, and performance stability are limiting factors in their use in machine tools. We have seen some progress recently through the use of transistors and magnetic circuit devices.

Builder Success Linked To Trained Manpower

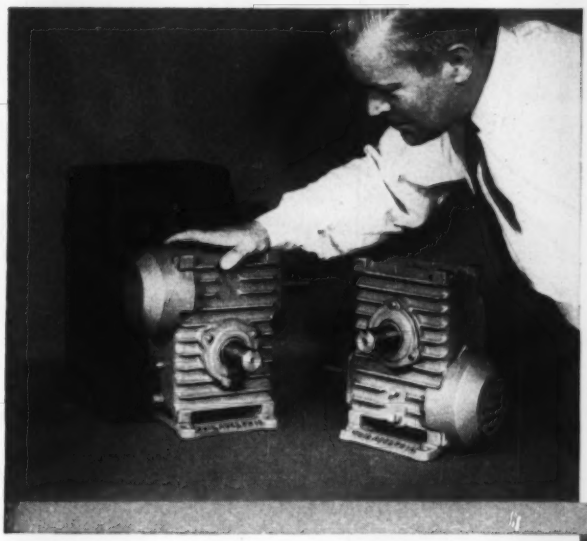
—E. H. H. GRAF

• The entire tone of the machine tool industry is changing. The single great factor which will determine the success of machine tool companies is their ability to produce a suitable number of experienced men. They must have the technical and practical experience necessary to work with ideas brought about by the rapidly changing demands of industry.

The companies with such men will succeed, and those without them will be unable to compete. I think the need for such personnel in the industry is increasing far out of proportion to the industry's ability to supply it.

We cannot avoid noting the weakness in certain age groups in the mechanical end of business. Further, as the complexion of our business changes and as new

new high capacity fan cooled reducers take up 50% less space



LOOK AT THE SPACE YOU SAVE!

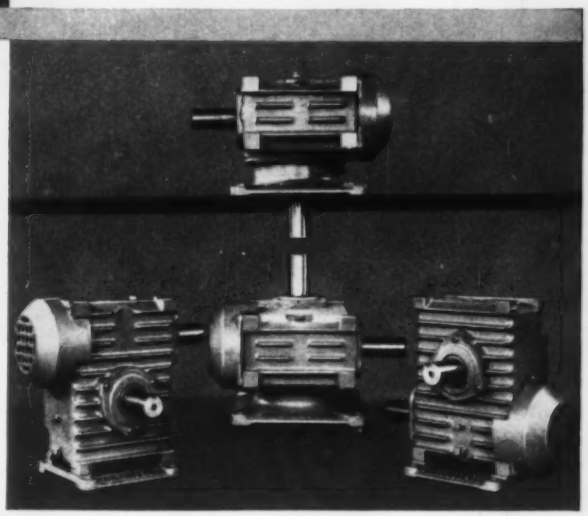
Think what this can mean to your products! You can make important savings in space and weight . . . in the neighborhood of 50% . . . depending upon output torque requirements. Or, you can design for heavier loads . . . up to 80% . . . without adding an ounce of weight to your product. You get more horsepower per dollar!

This new line of Philadelphia Fan cooled Worm Gear Reducers is available in 3, 3½ and 4″ center distances for ratios from 5 1/6:1 to 60:1. Fan cooling, sturdy finned housings, improved tooth forms, precision ground alloy steel worms and special high strength bronze gears all combine to give you a drive that will handle heavier loads in less space.

STANDARD STOCK PARTS SIMPLIFY SELECTION.

These new fan cooled units have a degree of simplicity and flexibility never before available. Standardized housings, fans, gearing and mounting bases permit you to select any drive arrangement you need . . . permit us to give you prompt delivery from stock.

They simplify your design problems too. For Example: horizontal units can be furnished without mounting bases. Housings can be designed as an integral part of your product.



For more information . . . horsepower ratings . . . dimensions . . . construction details . . . write for your copy of Bulletin WG-583.

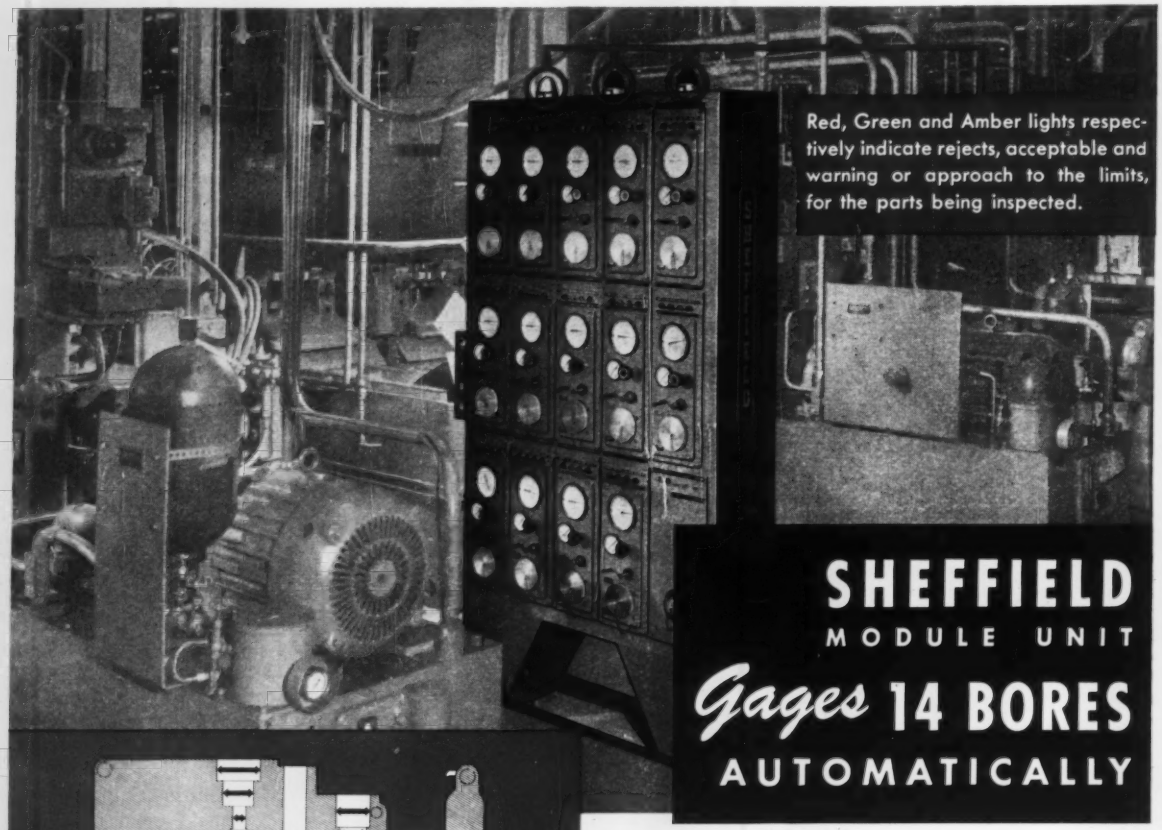
PHILADELPHIA GEAR CORPORATION

Erie Avenue and G Street • Philadelphia 34, Pennsylvania

philadelphia gear drives

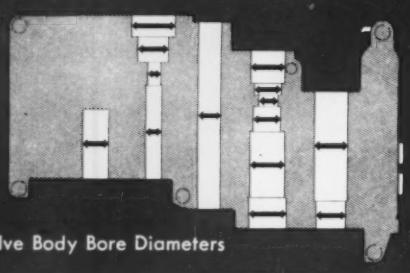
Offices in all Principal Cities • Virginia Gear & Machine Corp., Lynchburg, Va.

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS



Red, Green and Amber lights respectively indicate rejects, acceptable and warning or approach to the limits, for the parts being inspected.

SHEFFIELD MODULE UNIT *Gages* 14 BORES AUTOMATICALLY



Valve Body Bore Diameters

Transmission valve bodies directly from the boring machines are conveyed to gaging position. Air gaging spindles enter simultaneously to explore the dimensional fitness of each bore and to detect any possible obstruction such as a broken tool fragment.

The results of the pneumatic check are transformed into visual signals and electrical impulses—the latter for use in the automatic control of the boring machines.

Quicker, More Convenient to Adjust

The compact mounting panel carries an individual Sheffield Modulaire* for each dimension gaged. All adjusting elements and controls including the air pressure gage and visual indicator are right on the front of each Modulaire unit where they are most accessible and visible.

*Trademark

Servicing Greatly Simplified

Each Modulaire is a self-contained unit which may be slipped out of the assembly and replaced without interfering with other units of the assembly.

Each group of Modules is provided with a Sheffield Monitorecord Circuit for quickly checking the time cycles of the gaging functions. This is an integral part of every Sheffield Automatic Control System.

Longer Tool Service Life

Sheffield air gage spindles are designed with greater hole clearance to minimize wear. They float for slight differences in bore location and thus further extend service life.

Not Confined to Air Gaging

The sensing units of Sheffield automatic gages may also be electronic, electrical or mechanical as well as pneumatic. The choice depends on individual requirements or restrictions. Sheffield builds gages of all types as well as data handling systems.

8194

the SHEFFIELD corporation
of Bendix Aviation

manufacture and measurement for mankind

When you are considering an installation of this type, call a Sheffield engineer. His recommendations need not be biased. Or write the Sheffield Corporation, Dayton 1, Ohio, U.S.A. Dept. 17.

Machining

HENRY D. SHARPE JR.
President
Brown & Sharpe Mfg. Co.
Providence, R. I.

N. M. FORSYTHE
President
National Automatic Tool Co. Inc.
Richmond, Ind.

materials are adopted by industry, we no longer are permitted the luxury of knowing only our own line well. We now must know the other fellow's type of machining as well as our own.

New Machine Designs Aim at Versatility

—HENRY D. SHARPE JR.

• In our opinion, a major design objective in 1959 will be the development of more versatile machine tools.

Customers have liked the cost reductions made possible through the use of special machine tools but have disliked their inflexibility. They have made good use of standard machine tools which are well equipped with jigs or fixtures but have been disturbed by the cost of design changes necessitated by such tooling.

New, more versatile machine tools can offer the same fast production and yet be capable of doing a variety of jobs at no further investment.

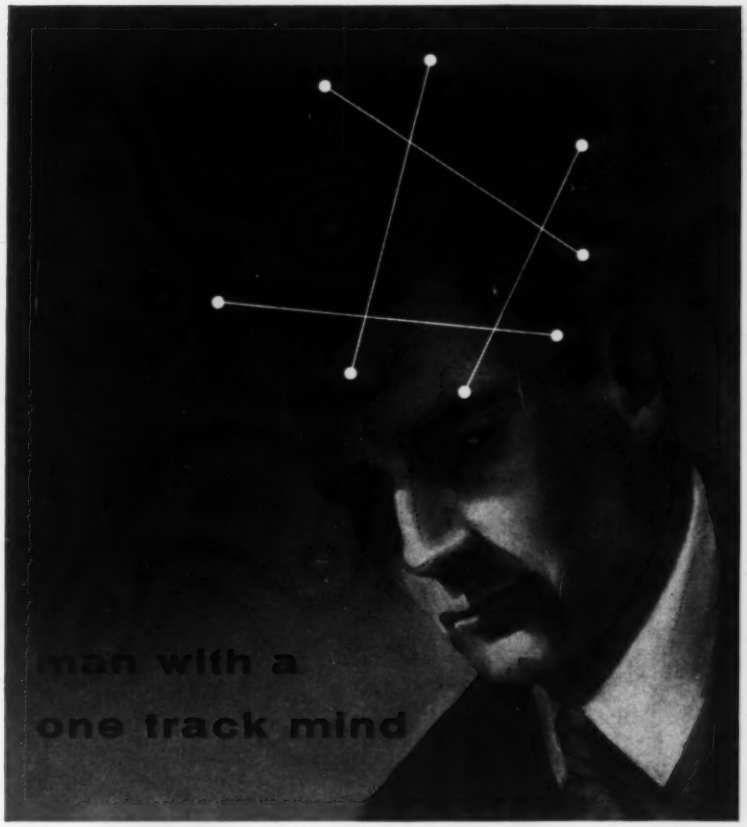
Still More Dramatic Machine Tool Developments To Come

—N. M. FORSYTHE

• This looks like the year in which tape control will get a solid foothold.

Prototype machines, controlled by tape and punchcard, have appeared in many places. Our customers are asking about

(*Please turn to Page* 314)



When specifying and designing a materials handling installation, the Logan field engineer has only one objective . . . "find the best solution to the problem." Usually there is *one* best answer to a materials handling question. "The man from Logan" has the imagination and versatility to design the conveyor system that most perfectly fits the specific requirement.

For more than two generations, the good name and reputation of Logan Co. has grown through consistent high standards of quality and long-term performance of Logan Conveyors. Leading mass producers have found that Logan Conveyors make a priceless contribution to saving production time, increasing plant output and conserving man power.

A Logan field engineer awaits the call to work with you. His expert analysis will help arrive at the solution that will result in the most productive and economical materials handling equipment for your need. A letter or phone call will start "the man from Logan" working on it. Won't you contact us today?

Logan Conveyors

LOGAN CO., 535 CABEL ST., LOUISVILLE 6, KY.

Howard Beacham tripled wheel life,

Howard Beacham has been a Bay State Abrasive Engineer for fifteen years and his total experience is double that. He's worked on grinding problems that have involved every type of metal in jobs as tiny as miniature bearings and as big as the world's largest air compressors and steam turbines.

cut dressing frequency in half at New Process Gear

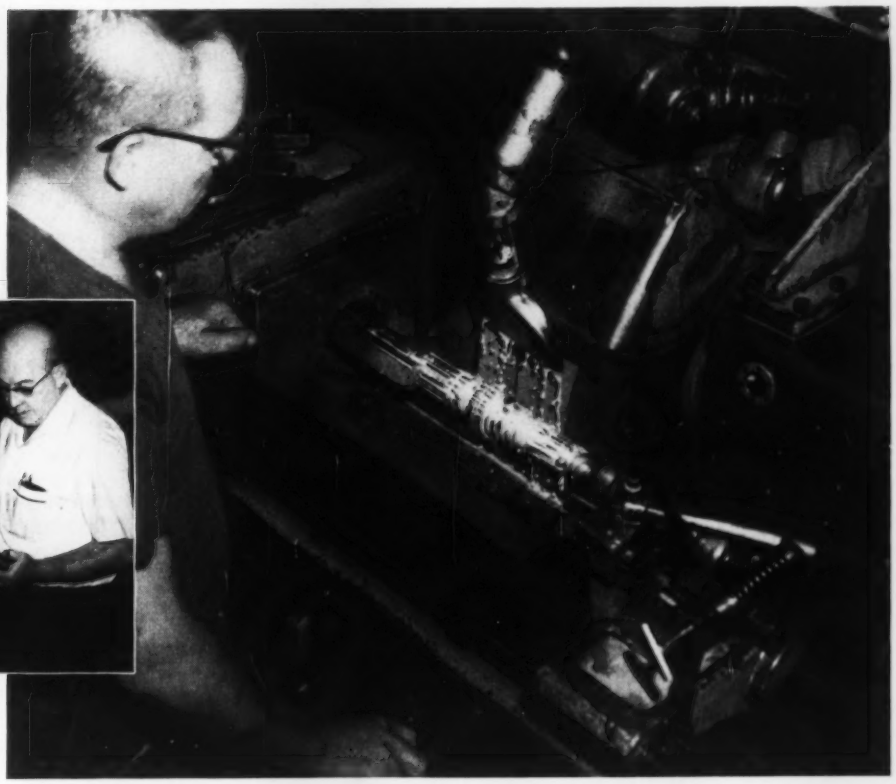
The closer you get to automation, the more it hurts to have production interrupted. That was the principal problem at Chrysler's New Process Gear Division where semi-automatic grinding of flats on truck transmission shafts was halted by wheel dressings every eleven pieces.

The three competitive wheels used in this simultaneous "cam grinding" operation wore down so fast they had to be replaced every week. And, on top of that, an alarming number of shafts were being cracked during the grinding operation.

Bay State's Howard Beacham was called in on the job. He specified a trio of Bay State wheels that produced really spectacular results.

Production jumped to twenty-five perfect shafts per dressing and wheel life went up to three full weeks. Finish was excellent, too.

Why not talk to your own Bay State representative next time you have a grinding problem? Like Howard Beacham he's a trained specialist. *Better grinding at lower cost . . . that is his business.*



Operator Henry Kotas runs grinder equipped with one 24 x 1-21/32 x 12 and two 24 x 1-3/4 x 12 Bay State wheels. The three wheels simultaneously grind flats on main shaft for 5-speed truck transmission.

(*Above*) Manufacturing Engineer Wiley Bell and Plant Superintendent Nelson Fisk examine finished truck transmission shaft.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

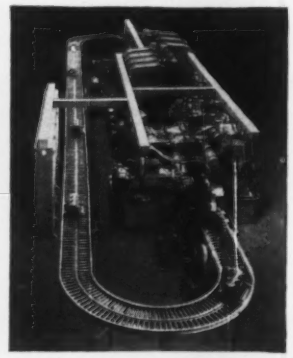
Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

STEEL from Wheelock, Lovejoy BULLETIN

W-L DETROIT For the first time, HY-TEN D-2 air hardening steel now available here in rounds, squares, flats and billets. Also a fine stock of standard alloy grades, especially A-8620, as well as all HY-TEN grades. Excellent service from our new warehouse.

W-L CHICAGO Steady demand for "B" No. 3X for flame-hardened parts such as boring bars. Good stocks of HY-TEN AIS the best carburizing alloy steel, and freest machining available today—a new W-L exclusive!

W-L CINCINNATI This 23-station Avey Line-O-Dex transfer machine, designed and built by The Avey Division of Motch & Merryweather Machinery Co., Cincinnati, Ohio, is equipped with spindles made of our HY-TEN "B" No. 2. This grade was chosen for its great tensile strength (100,000 P. S. I. in the natural condition), toughness, and fine wearing qualities.



W-L CAMBRIDGE We are now distributing FLEXANGLE, the easy-to-erect structure assembly for all types of racks, shelves, platforms, etc. It's completely universal and low in cost — can be used anywhere, by anyone, for any storage purpose.

W-L HILLSIDE Our stock of flat and square sizes in HY-TEN M Temper Oil Hardening Steel can save you time and money in your tooling program. HY-TEN "B" No. 3X pre-heat treated in rounds, squares and flats available in a wide range of sizes. Billets on hand for hammer forging in all grades of HY-TEN.

W-L CLEVELAND Excellent stock of brake die flats and squares. Also many sizes up to 16" x 18" in HY-TEN Mold Steel. Excellent deliveries.

W-L BUFFALO A wide range of rounds and hexagons in cold drawn AISI leaded and non-leaded A-4140. Also many sizes of the new "B" No. 3X-40 in rounds and hexagons.

Write our Cambridge office today for your *free* Wheelock, Lovejoy Data Sheets. They'll give you complete technical information on grades, applications, physical properties, tests, heat treating, etc.

WHEELOCK, LOVEJOY & COMPANY, INC.
132 Sidney Street, Cambridge 39, Mass.

AMERICAN STEEL WAREHOUSE ASS'N

AGENTS: Southern Engineering Company, Charlotte, N. C.; Sanderson-Newbould, Ltd., Montreal & Toronto

Machining

JOSEPH H. BUHR
President
Buhr Machine Tool Co.
Ann Arbor, Mich.

applications and conversion possibilities. Potential users are accepting the idea that blueprints can be converted into coded instructions which a properly equipped machine can read and execute with superior speed and accuracy.

This rejuvenation of multipurpose tooling through numerical control comes none too soon; the days of single-purpose tools are numbered. Automobiles and appliances go out of fashion overnight, and we can no longer afford to make tools which become obsolete with the model change. So, we are starting to build single-purpose tools made of units which can be taken apart and reassembled at will into machines as new as the product they make.

Beyond numerical control and modular machine construction, we can get a glimpse of still more dramatic tool developments. We are on the threshold of machining with "superforces"—explosive speeds and feeds. Explosive metal forming is already a commercial wonder. In another five years—maybe less—explosion and detonation will be harnessed to machine metal as well.

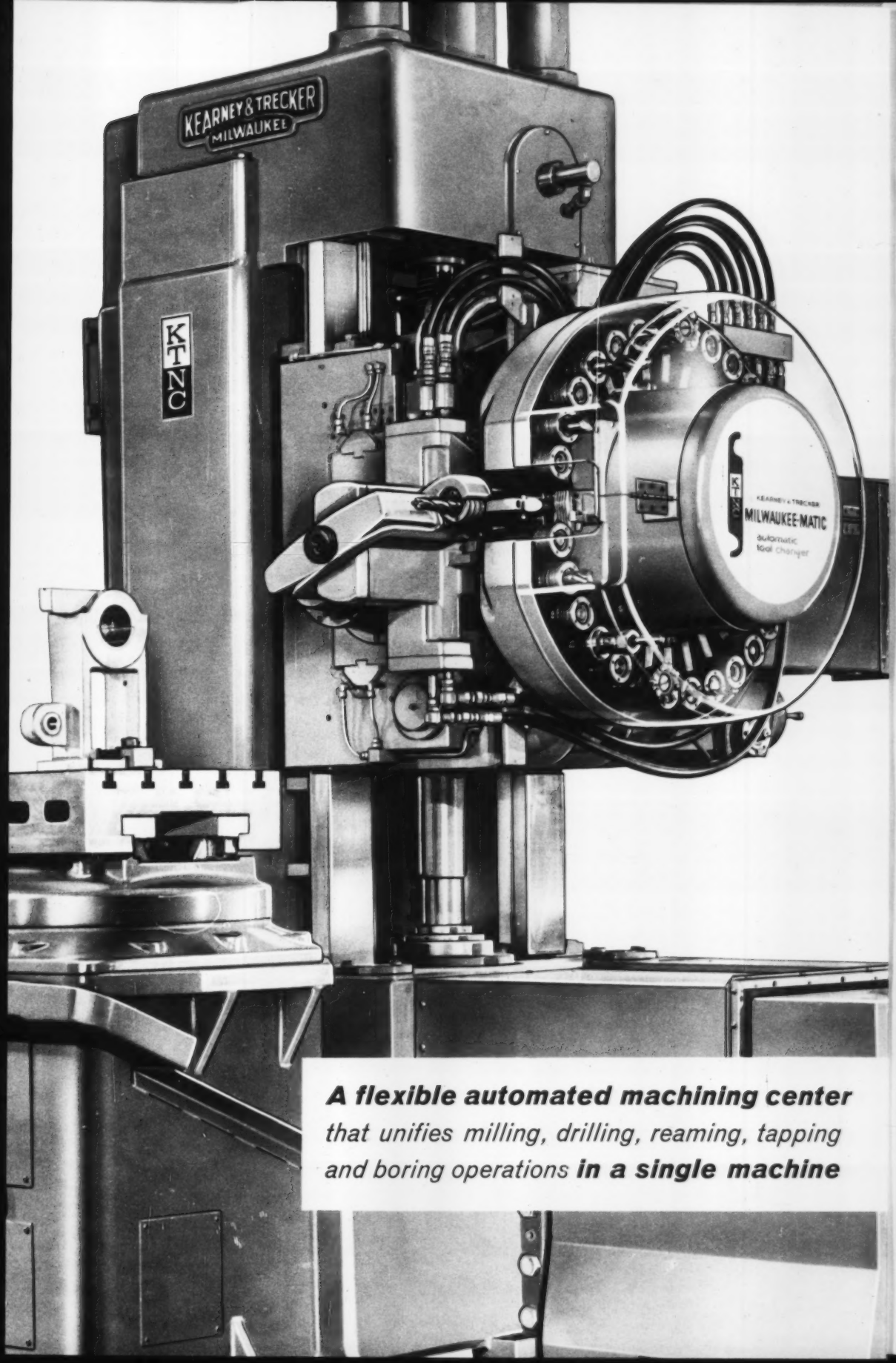
Over-all Productivity Is Design Target

—JOSEPH H. BUHR

• During the next few years, major attention in manufacturing will be given to increasing over-all productivity. Productivity as a whole cannot be increased without improving productivity all along the line: Direct labor, indirect labor, supervisory, service and office operations; engineering; and distribution.

Machine tool producers will be expected to contribute in an important way to improving productivity in manufacturing. Several trends have already be-

(*Please turn to Page* 319)



A flexible automated machining center
that unifies milling, drilling, reaming, tapping and boring operations ***in a single machine***

*a machine that harnesses the **full** poten*

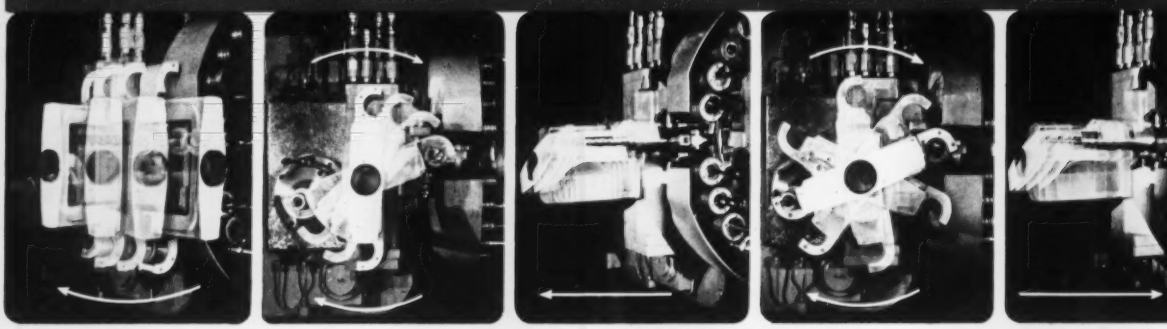
Kearney & Trecke

KTNC MILWAUKEE-

a flexible automated machining center that unifies

reaming, tapping and boring operations in a

Here it is! KTNC AUTOMATIC TOOL CHANGER I



In a matter of seconds this exclusive **MILWAUKEE-MATIC** *feature changes your production schedules from* ***MONTHS TO MINUTES!***

Here's what MILWAUKEE-MATIC means to your operations

The MILWAUKEE-MATIC is the *most significant achievement* of the machine tool industry in the last 50 years. Briefly, it is a single machine that performs the many operations that are normally accomplished on several other machines to complete a part. MILWAUKEE-MATIC will improve almost every aspect of administrative planning—from plant management and finance to engineering and production.

- **Offers flexible automation for job-lot producers through numerically controlled positioning, straight-line milling, arcs and slopes, tool selection, indexing and speeds and feeds.**
- **Cuts working capital requirements... balances inventory.**
- **Boosts machine cutting time by as much as 75% by applying off-machine workpiece set-up.**
- **Slashes tooling cost... savings can pay for MILWAUKEE-MATIC in one to three years.**
- **Reduces lead time from months to days... permits rapid new product introductions and product changes.**

KEARNEY & TRECKER MILWAUKEE ®

KEARNEY & TRECKER CORPORATION, Dept. KTNC
6800 W. National Ave., Milwaukee 14, Wisconsin

Designers and Builders of Precision and Production Machine Tools Since 1898

ntial of numerical control:

***ker** Tape-Controlled*

-MATIC

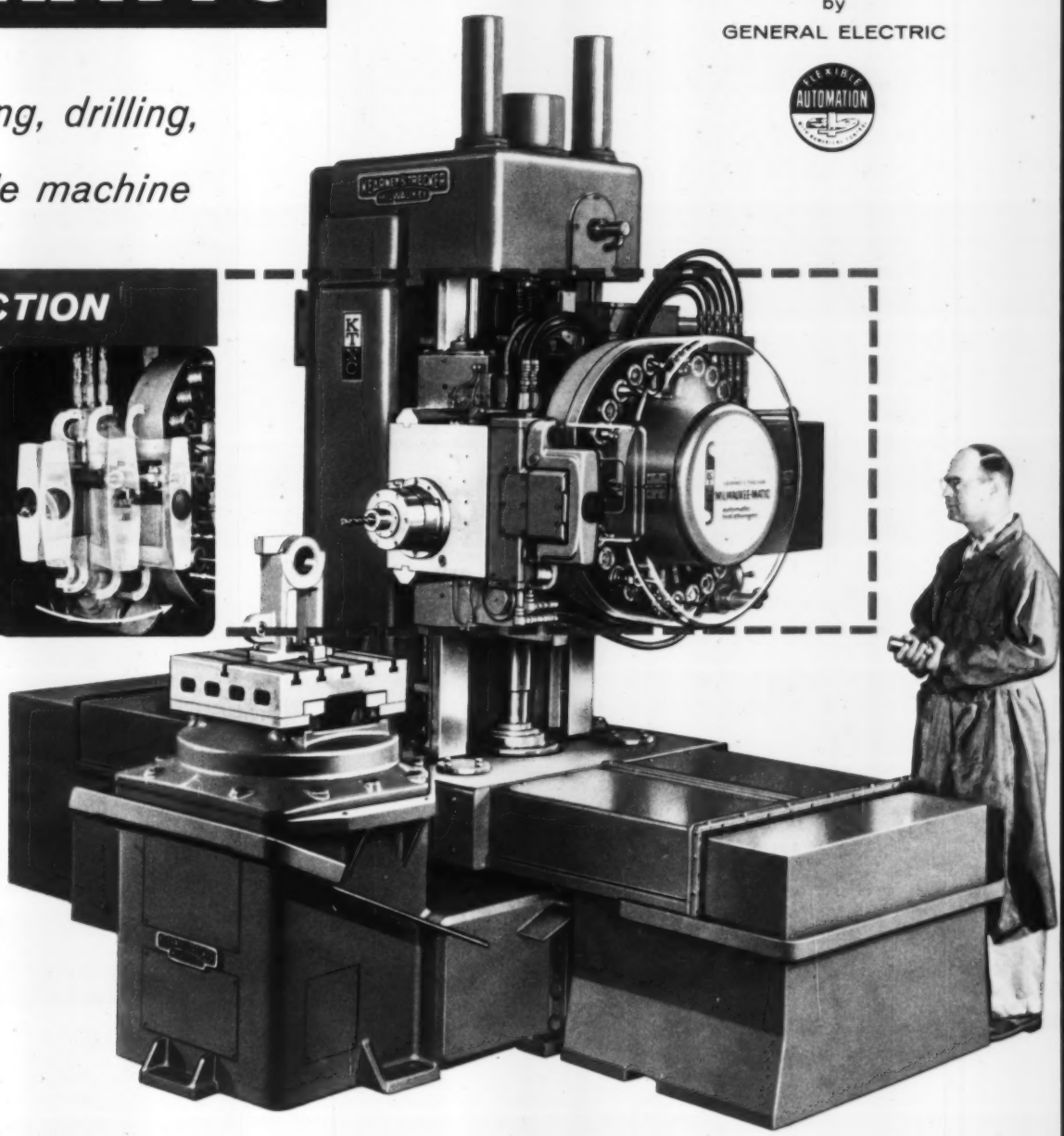
milling, drilling,

single machine

Program Controls
by
GENERAL ELECTRIC

FLEXIBLE AUTOMATION

IN ACTION



See Back Page...

FOR FANTASTIC SAVINGS!

KEARNEY & TRECKER
MILWAUKEE ®

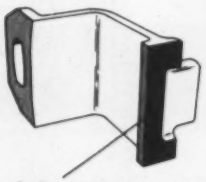
How MILWAUKEE-MATIC *saved $1637.89* on tooling costs alone compared to conventional machining methods

Motor bracket.

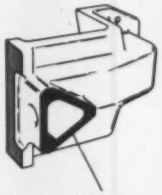
DESCRIPTION	CONVENTIONAL	MILWAUKEE-MATIC
Cycle time	38.7 min.	15.37 min.
Set-up time	4.62 hrs.	.25 hrs.
Tooling	$1894.00	$256.11
Savings on tooling costs alone . . .		$1637.89

® Trademark Reg. U.S. Pat. Off.

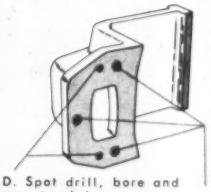
A. Rough and finish mill two surfaces. Time, 2.51 min.



B. Rough and finish mill one surface. Time, 1.36 min.



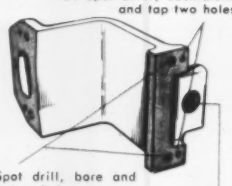
C. Rough and finish mill one surface. Time, .89 min.



D. Spot drill, bore and ream two holes.

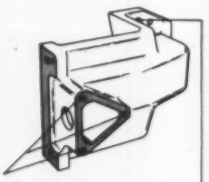
E. Spot drill and drill 3 holes. Time, 3.42 min.

G. Spot drill, countersink and tap two holes.



F. Spot drill, bore and ream two holes.

H. Spot drill, drill and bore one hole. Time, 4.19 min.



I. Spot drill, countersink and tap three holes.

J. Counterbore three holes (in back.) Time, 3.00 min.

Only one single holding fixture and one set-up required to perform 49 operations described above.

CONTACT THESE MILWAUKEE-MATIC SALES REPRESENTATIVES

ATLANTA, GA.
Scott Machine Tool Co.
411 Williams St., N.W.

BENTON HARBOR, MICH.
Jackson-Fotsch Co.
P. O. Box 356

BIRMINGHAM, ALA.
George M. Meriwether Inc.
1712 Seventh Ave., North

BOSTON, MASS.
Stedfast & Roulston, Inc.
11 Deerfield St.

BUFFALO, N. Y.
Syracuse Supply Company
1965 Sheridan Drive

CHARLESTON, W. VA.
Wm. S. Bolden Co., Inc.
MacCorkle Ave.

CHATTANOOGA, TENN.
Scott Machine Tool Co.
116 Dauphin Way

CHICAGO, ILL.
Jackson-Fotsch Co.
7350 West Lawrence Ave.

CINCINNATI, O.
The E. A. Kinsey Co.
327-335 W. Fourth St.

CLEVELAND, O.
Kearney & Trecker Corp.
Euclid Ave. & E. 17th St.

COLUMBUS, O.
The E. A. Kinsey Co.
1020 W. Fifth St.

DALLAS, TEX.
Greene Machinery Co.
6300 Wyche Blvd.

DAYTON, O.
The E. A. Kinsey Co.
16 Washington St.

DENVER, COLO.
F. J. Leonard Co.
1219 California St.

DETROIT, MICH.
Kearney & Trecker Corp.
10600 Puritan Ave.

GREENSBORO, N. C.
Smith-Courtney Co.
814-820 Winston St.

HICKORY, N. C.
Smith Courtney Co.
103 3rd Street, S.W.

HOUSTON, TEX.
Steel & Machine Tool Sales
6414 Navigation Blvd.

INDIANAPOLIS, IND.
The E. A. Kinsey Co.
1550 Stadium Drive

JACKSONVILLE, FLORIDA
Scott Machine Tool Co.
1111 Legay Avenue

KANSAS CITY, MO.
Blackman & Nuetzel Machinery Co.
1103 E. Armour Blvd.

LOS ANGELES, CALIF.
Moore Machinery Co.
3200 S. Garfield Ave.

MILWAUKEE, WIS.
Kearney & Trecker Corp.
6800 W. National Ave.

MOLINE, ILL.
Jackson-Fotsch Co.
2920 25th Ave. "A"

NEW YORK, N. Y.
Kearney & Trecker Corp.
409 Grand Ave.
Englewood, New Jersey

NEW ORLEANS, LA.
Stauss & Haas, Inc.
524 Camp St.

OMAHA, NEB.
Fuchs Mach. & Supply Co.
2401 N. Eleventh St.

PHILADELPHIA, PENN.
Kearney & Trecker Corp.
Suburban Square Bldg.
Ardmore, Penna.

PHOENIX, ARIZ.
Moore Machinery Co.
45 W. 1st Ave.,
Scottsdale, Ariz.

PITTSBURGH, PENN.
Kearney & Trecker Corp.
4 West Manilla Ave.

PORTLAND, ORE.
Harry M. Euler Co.
2811 N.E. Glisan St.

RICHMOND, VA.
Smith-Courtney Co.
Seventh & Bainbridge Streets

ROCHESTER, N. Y.
Syracuse Supply Company
311 Alexander Street

ST. LOUIS, MO.
Blackman & Nuetzel Machinery Co.
3713 Washington Ave.

ST. PAUL, MINN.
Sales Service Mach. Tool Co.
2363 University Ave.

SALT LAKE CITY, UTAH
Todd Machinery Co.
140 W. 2nd South St.

SAN DIEGO 3, CALIF.
Moore Machinery Co.
3525 Fifth Ave.

SAN FRANCISCO, CALIF.
Moore Machinery Co.
7th & Carleton — Berkeley

SAN JOSE, CALIF.
Moore Machinery Co.
656 Stockton Ave.

SEATTLE, WASH.
Dawson Machinery Co.
5700 First Ave., S.

SHREVEPORT, LA.
Peerless Supply Co., Inc.
Spring and Crockett Sts.

SYRACUSE, N. Y.
Syracuse Supply Company
314-332 West Fayette St.

TULSA, OKLA.
White Star Machinery Co.
3216 E. 21st Street

WICHITA, KAN.
White Star Machinery Co.
301 N. St. Francis

CANADA

MONTREAL
OTTAWA
QUEBEC
TORONTO
WINDSOR
Williams & Wilson Ltd.

KEARNEY & TRECKER CORPORATION
6800 W. National Avenue, Milwaukee 14, Wisconsin

I would like to make the following MILWAUKEE-MATIC arrangements:

- ☐ Have Kearney & Trecker representative call me for MILWAUKEE-MATIC film demonstration appointment.
- ☐ Send me new MILWAUKEE-MATIC Bulletin.
- ☐ Send me schedule of MILWAUKEE-MATIC Workshop dates.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

Mail coupon

for MILWAUKEE-MATIC demonstrations . . .

Attend private Workshop Sessions at Kearney & Trecker in Milwaukee

See Milwaukee-Matic film demonstration in your plant or at your nearest Kearney & Trecker distributor's office

Machining

DON S. CONNOR
President
Micromatic Hone Corp.
Detroit

come apparent. Among the most important are: Greater attention of purchasers to the real costs of new machine tools, compared with purchase price, wider use of multioperation machines, increased stress on the convertibility of machines to extend their life beyond the original use at minimum changeover cost, and demand for increased accuracy.

Those factors are interrelated. The trend to wider application of multioperation equipment—both in so-called transfer machines and in single machines of the indexing, shuttling, or trunnion type—has in itself placed added emphasis on convertibility, accuracy, and real cost.

Accuracy in the work the machine turns out is inevitably dependent on the accuracies to which machines are built. Close interchangeability tolerances on machine components are in turn a requisite to facilitate convertibility.

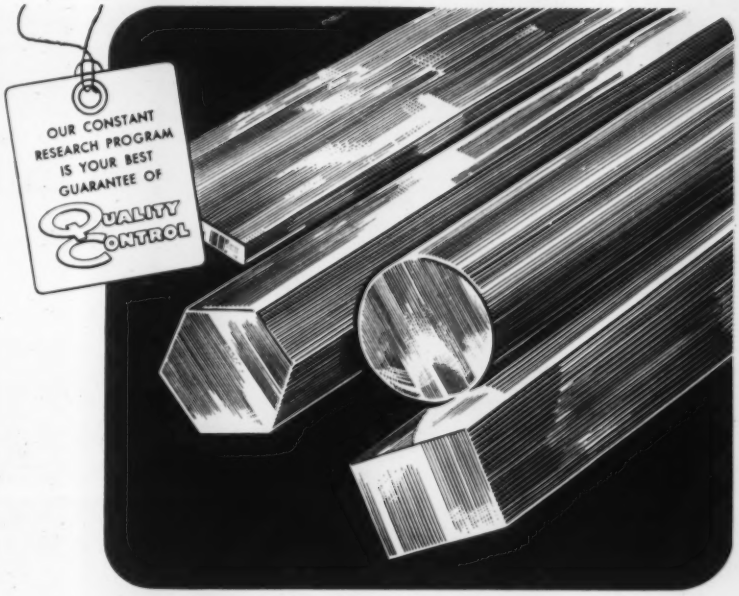
Improved Forming Methods Will Reduce Machining

—DON S. CONNOR

• In the next few years, as we enter the "soaring sixties," there will be many revolutionary developments in materials, processes, and products. The developments, and the machine tools that make them possible, are the result of a need for constant improvement in product quality and a reduction in manufacturing costs.

The ultimate in processing would be to form the part to close dimensional tolerances and to generate the desired functional characteristics (in one machining operation) so accurately and consistently that scrap would be practically eliminated. It is in this area that I believe the greatest advances will be made in the next few years. The amount of material cut away in chips will be

(*Please turn to Page 322*)



Patronize your
local steel service center
for "On the Spot" Deliveries of
WYCKOFF
cold finished steels

Their large, diversified stocks insure fast, dependable shipments of the grades, sizes and quantities you currently require.

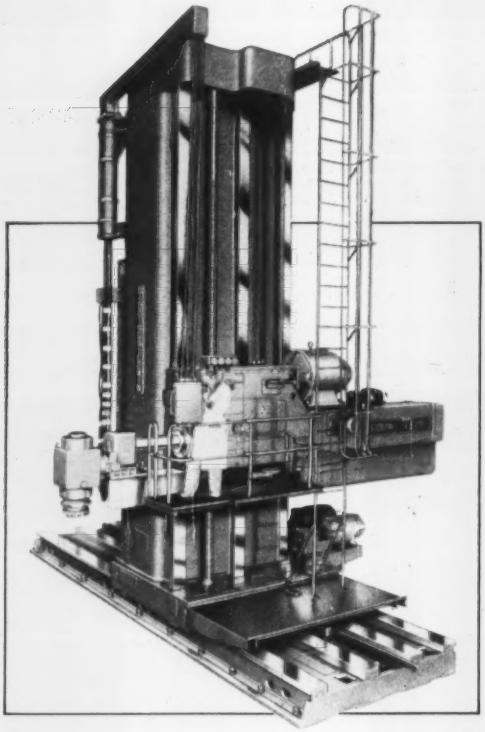
For positive uniformity, ultimate machinability, superior finish and longer tool life—be sure of these production advantages by specifying **WYCKOFF.**

SPECIALISTS IN COLD FINISHED STEELS EXCLUSIVELY
WYCKOFF STEEL COMPANY

GENERAL OFFICES:
Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works: Ambridge, Pa., Chicago, Ill., Newark, N.J., Putnam, Conn.

WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

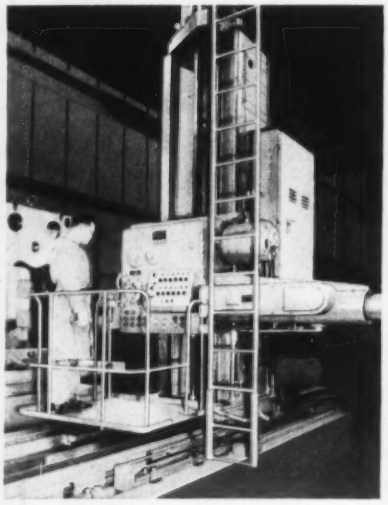
Ideas on tooling for cost reduction



NEW. Designed to reduce the cost of heavy drilling, large-hole boring, and heavy milling on huge workpieces, G&L's new 8″ or 10″ spindle 80 Series machines feature more than 20 feet of vertical headstock travel.

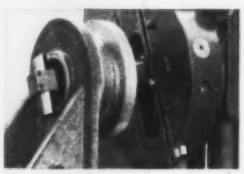
Machines are available with an underarm; cross-sliding column; or a planer-type table.

Giddings & Lewis offers table-, floor-, and planer-type horizontals with spindle diameters ranging from 3″ through 14″ and with electronic controls for template tracing, numerical positioning, or numerical contouring. ASK FOR CATALOG 80-F.



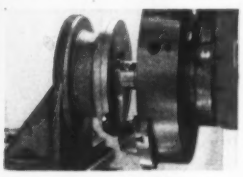
NEW. This tape-controlled automatic horizontal boring, drilling, and milling machine has effected a 30% direct cost reduction in machining printing press parts. Big additional savings come from elimination of jigs and fixtures. The simple, punched paper tape control system repeats with high accuracy. These 4″ or 5″ dia. spindle machines also can be operated by manual pushbutton or digital dial control. A product of G&L's Kaukauna Division. ASK FOR CATALOG H-6.

All these operations, and more—for faster machining, less handling, fewer setups, with versatile G&L horizontal bars



Backfacing with continuous feed facing head.

Turning and boring with continuous feed facing head.



GL-100

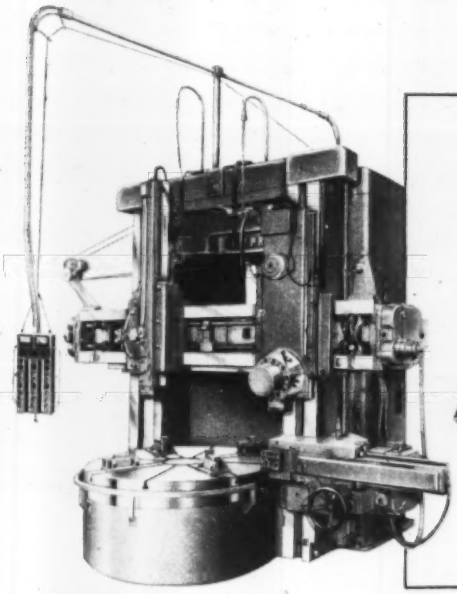
with new multi-purpose Giddings & Lewis machines

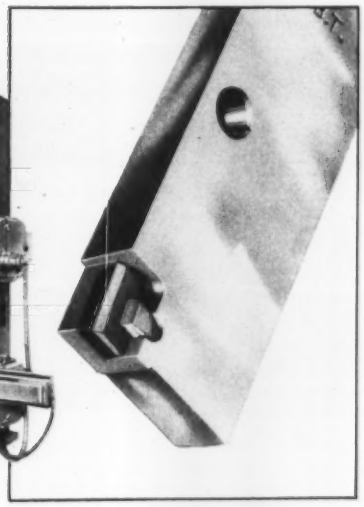
Pictured here are a few of the opportunities for reducing workhandling—for multiple tooling—and for combining on one machine jobs commonly routed to two or more different machines.

Faster and fewer setups—faster machining—fewer nonproductive operations—easier, faster operation—quicker tool changes—and increased machine utilization are among the factors that warrant your full investigation of G&L equipment. Call your G&L distributor, or write.

GIDDINGS & LEWIS

Giddings & Lewis Machine Tool Company, Fond du Lac, Wisconsin

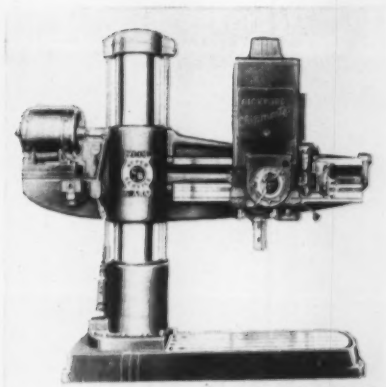




NEW. A vertical boring and turning mill with speed and control that put it out in front for cost reduction. Complete remote control from a pendant station includes preselect of all ram and saddle feeds. Optional constant cutting speed increases tool life, reduces downtime—table speed changes made without stopping or changing gear. Table diameters from 54″ to 14′. Tracer or magnetic tape control available. ASK FOR CATALOG VBM-4.

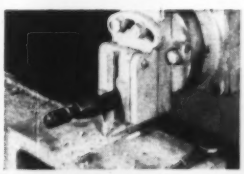
NEW. With Davis throwaway tip block cutters for your STANDARD Davis block-type bars, tool costs can be reduced and production increased. Here's why: (1) instant tip indexing with minimum downtime; (2) carbide grinding eliminated; (3) low cost per cutting edge—eight edges on negative rake tool, four on positive rake tool; (4) less tool inventory required.

This is a development of G&L's Davis Boring Tool Division. ASK FOR BULLETIN DB-410.



NEW. Boring, facing, and *Class 3 thread tapping* of a 5″ dia. hole in 1½ minutes on the Chipmaster radial—12.5% the previous machining time!

Product of G&L's Cincinnati Bickford Division, the all-new Chipmaster has preloaded bearing spindle to take severe thrust loads of heavy boring, spade drilling, and facing. Instant spindle reversal at speeds to 2300 rpm cuts tapping costs. 4′—13″ to 8′—19″ sizes. ASK FOR CATALOG R-35.



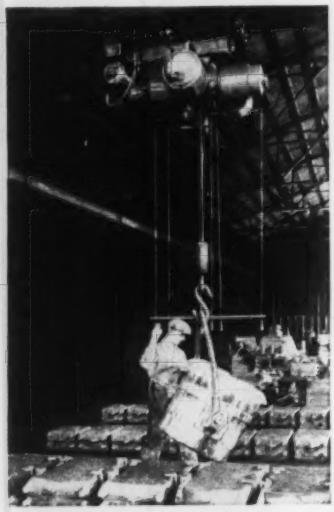
Keyway Cutting with underarm and shaper head.

Boring and Turning Diameters up to 150″ with tool on face plate drive.

Angular Milling attachment mounted on underarm.

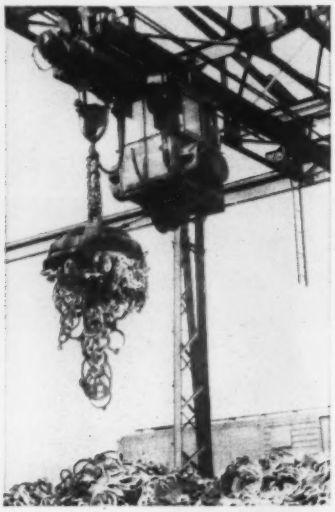
Extending Machine Range to save repositioning of work.

WHICH HOIST
fits your plant's needs?



SHEPARD NILES
FLOOR-OPERATED HOIST

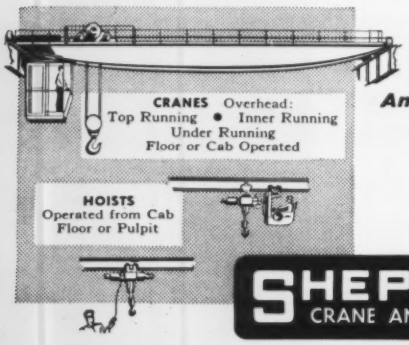
Operator primarily occupied with other duties. Uses hoist for fast, efficient handling of relatively short hauls.



SHEPARD NILES
CAB-OPERATED HOIST

Operator in cab moves loads along at high speeds, occupies best vantage point for spotting and stacking material.

THE RIGHT HOIST . . . can reduce your plant's handling costs. But which one is best for the job . . . a floor-operated hoist where the operator is freed for other duties or a cab-operated hoist where he is engaged fulltime moving loads through the air? Because Shepard Niles manufactures both types of hoists . . . as well as a complete line of cranes . . . we can approach your handling problem with an open mind.



Send for Bulletins describing Shepard Niles Cab and Floor-Operated Hoists. And request our representative to call.

America's Most Complete Line

of Cranes and Hoists

Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION

2388 Schuyler Ave., Montour Falls, N. Y.

Machining

JOHN F. KAHLES
Vice President
Metcut Research Associates Inc.
Cincinnati

greatly reduced. The number of machine tools, conveyors, and operators required will be minimized. Tolerances now only obtained in the toolroom or laboratory will become common production standards.

An example of such processing: The generation of an accurate sphere on the ball stud used in ball joints suspension system. The machining processes have been greatly improved, and costs have been materially lowered.

Bold Research Attack Needed for Machining

—JOHN F. KAHLES

• Many new materials for construction of airpower (and those contemplated for the future) are high temperature, high strength, and ultrahigh temperature alloys. Without exception, these new alloys present difficult machining problems by all conventional methods of metal removal. Such problems are not insurmountable in limited production, but in high production many of the alloys must be regarded as unmachinable at present.

Many producers for aircraft and missiles and Defense Department agencies feel that the tool which will have the greatest impact in solving large production machining of these alloys is research, both theoretical and applied.

Needed: A broad frontal attack on all of the unusual alternate machining methods, such as electrical discharge, Chem-Milling, electro Chem-Milling, high volume grinding, electrolytic grinding, and jet blasts. It appears that even these methods will not be sufficient and that new approaches must be taken.

In the case of high strength alloys, such as steel in the 300,000 psi class, a feasible solution may be found in performing volume metal research in the

(*Please turn to Page* 326)

"Yes this was a modern shop in 1939——but..."

Why wait for new machine tools?

Now you can buy them out of increased earnings

Planning for the future is sound policy. But if you still have old-time machines that can't compete with the newer, more efficient equipment, then the future is already here!

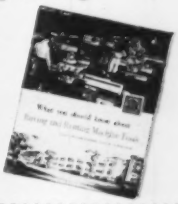
Lost profits can't be replaced. But obsolete equipment can—and should be replaced before losses mount higher!

The lack of "normal" cash reserves no longer forces you to wait—to put off until some future date the savings...and earnings...that can start right now. Why not take advantage of Gisholt's Leasing and Extended Payment Plans? Either one will enable you, without tying up important capital, to put these more efficient producers to work on a "pay-as-they-earn" basis...and give you a running start when you need them most.

More and more forward-looking executives are turning to our leasing and extended payment plans as the best kind of future planning.

Ask for this important bulletin

"What You Should Know About Buying and Leasing Machine Tools" is an authoritative booklet which discusses the facts about depreciation, tax angles and details of this timely subject. Use the coupon to get your free copy.



GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gishholt Machine Company
1217 E. Washington Ave., Madison 10, Wisconsin

Without obligation, please send your Bulletin 1173 with details regarding leasing and extended payment plans.

Name..... Title.....

Company.....

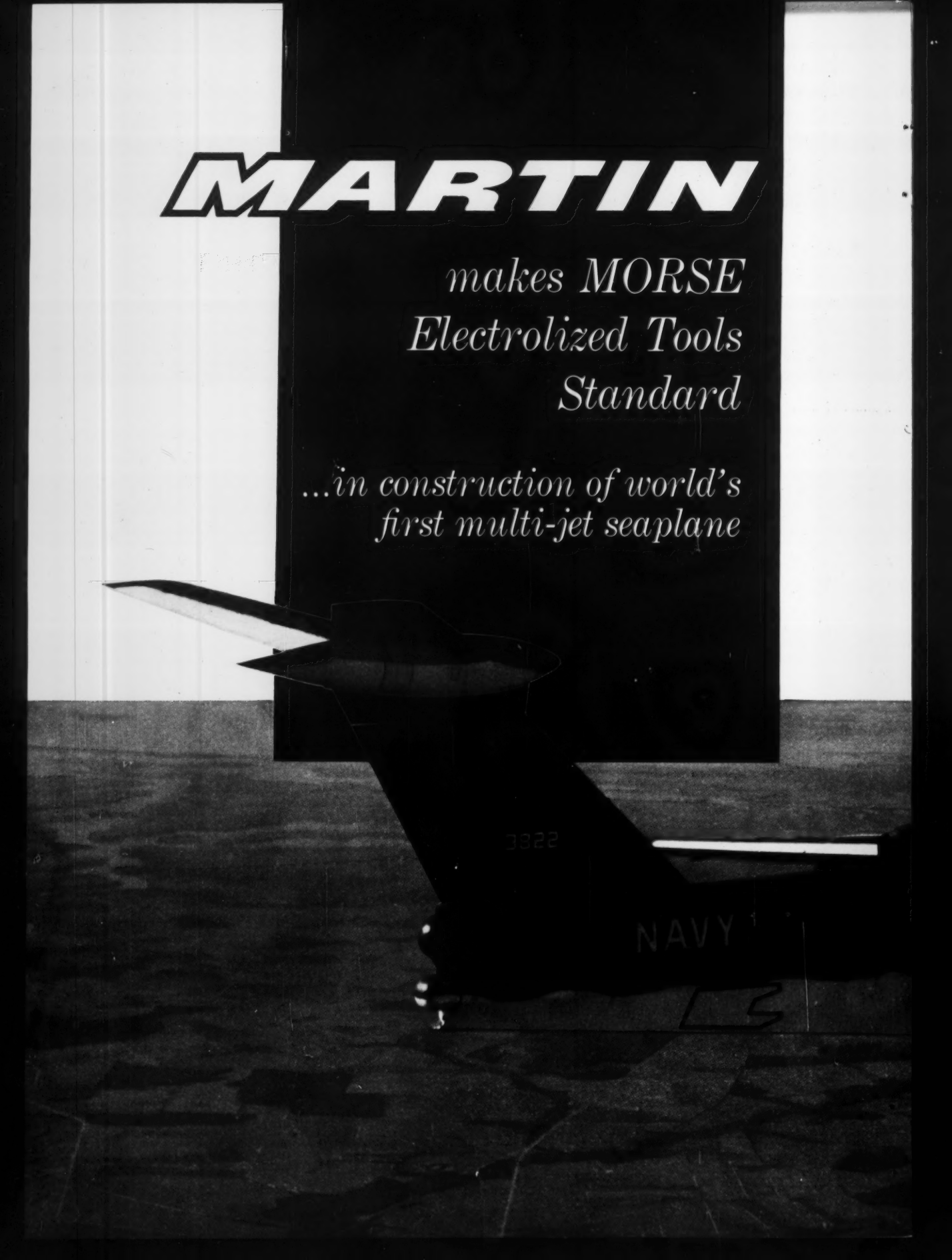
Address.....

City..... Zone.... State.....

MARTIN

makes MORSE
Electrolized Tools
Standard

...in construction of world's
first multi-jet seaplane



NEW MARTIN P6M "SEAMASTER" is one of the fastest low-altitude attack aircraft in the air today . . . a 134-foot giant with 4 turbojets that develop more than 600 mph.

Preparing for production, Martin spent 6 months testing tools for drilling epoxy laminated fibreglass printed wire cards.

FINAL CHOICE: MORSE Electrolized Triple Treatment Drills.

RESULTS: 400% more clean holes, with no tearing of thin copper sections around the holes.
400% fewer drills ground per day.
Less down time, higher production.

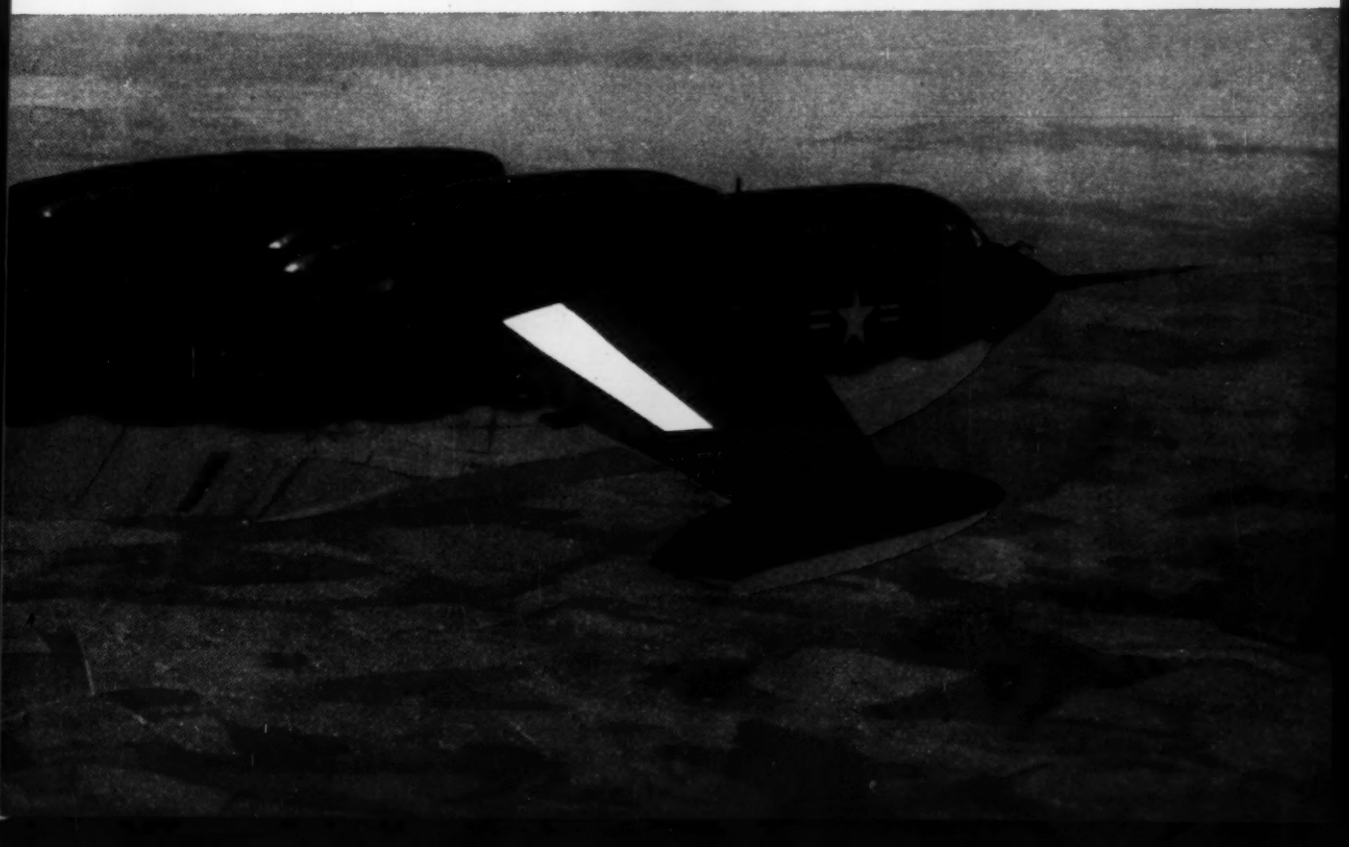
And you can get comparable results with Morse Electrolized Tools . . . available *only* from your Morse-Franchised Distributor. *Call him now.*

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASSACHUSETTS
A Division of VAN NORMAN INDUSTRIES, INC.

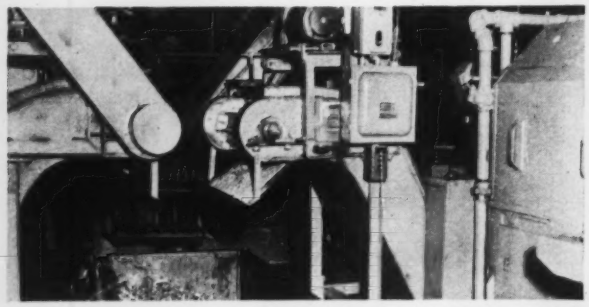
MORSE

means "THE MOST" in Cutting Tools

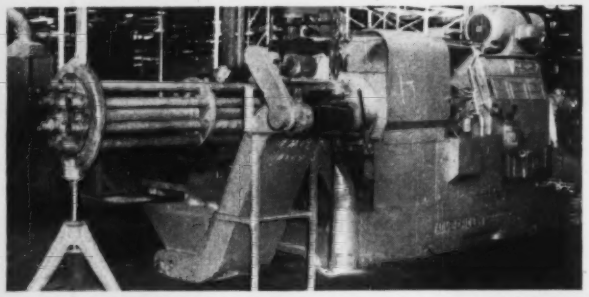
WAREHOUSES IN NEW YORK, CHICAGO, DETROIT, DALLAS, SAN FRANCISCO



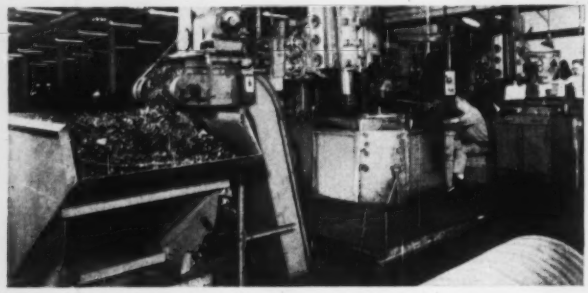
MAY-FRAN CHIP-TOTES



PROVIDE AUTOMATIC AND

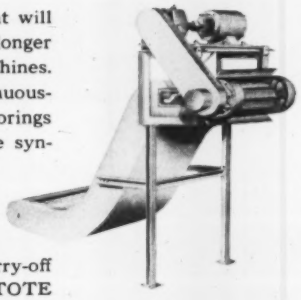


CONTINUOUS SCRAP REMOVAL



FROM ALMOST EVERY TYPE AND SIZE OF MACHINE TOOL

Here is a machine tool accessory that will cut production costs, and permit longer "run" times for your automatic machines. The MAY-FRAN CHIP-TOTE continuously removes the chips, turnings and borings from machines. The conveyor can be synchronized with the metal removing capacity of the machine. Scrap is channeled onto the CHIP-TOTE belt, carried clear of the machine for discharge into tote box or carry-off conveyor system. There is a CHIP-TOTE for every machine tool.



MAY-FRAN ENGINEERING, INC.

1725 Clarkstone Road, Cleveland 12, Ohio

For complete facts, write today and ask for MF-640.

Machining

RALPH B. BILLINGHAM
Vice President
W. F. & John Barnes Co.
Rockford, Ill.

soft-annealed state. The finishing by grinding could then be accomplished after heat treatment.

Another plausible solution, not too remote, is the development of a new tool material. Ceramics are showing promise but certainly have not arrived. Nonetheless, the direction shown in the ceramic tool field appears sound and might possibly produce the new cutting tool material that is so urgently needed.

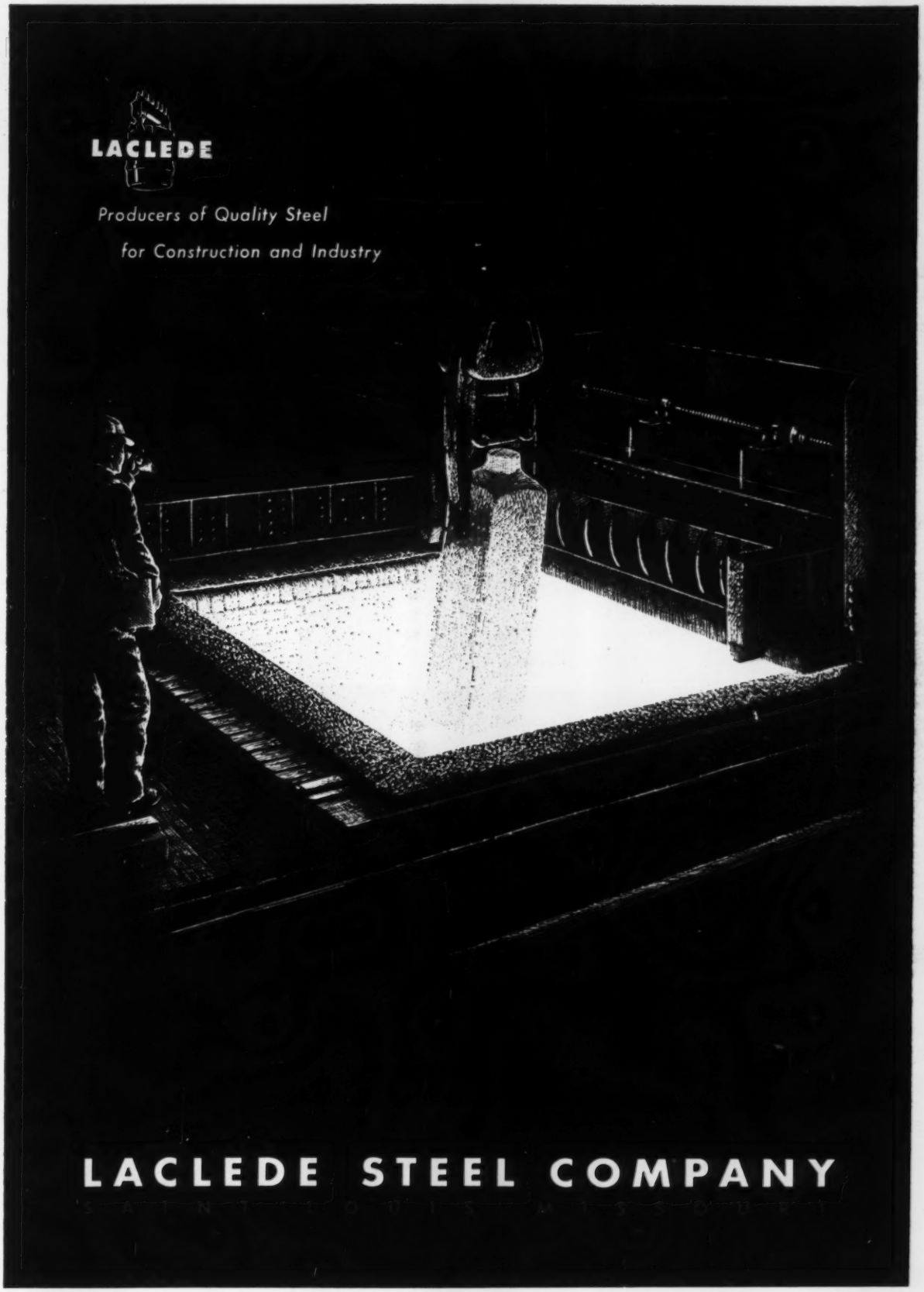
New Machines Aimed At Troublefree Operation

—RALPH B. BILLINGHAM

• Automatic processes and automatic machines will be in continued and increased use and demand by all manufacturers. Production with dial type, vertical type, trunnion type, way type and progress through machines is largely controlled by factors like machine maintenance, tool maintenance, part variations, and possible control trouble.

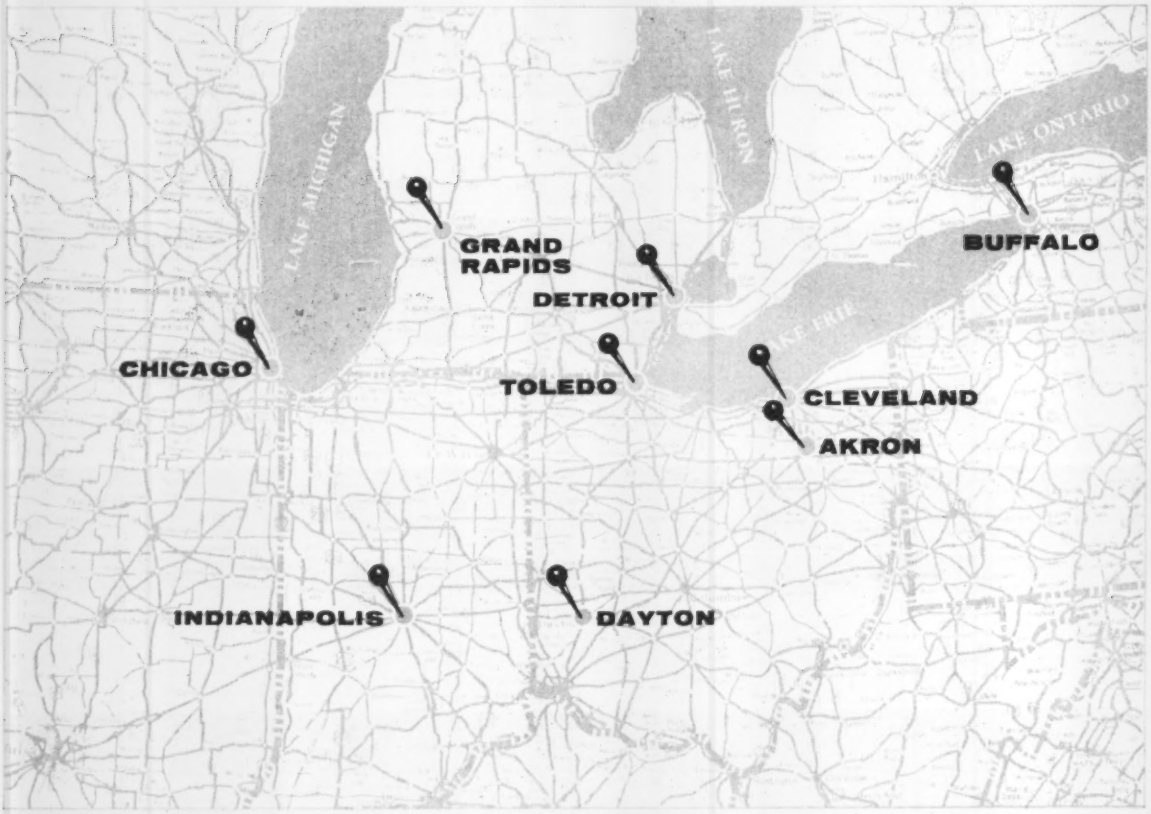
Newer machine designs will reduce trouble from these production controlling factors to a minimum, and some troubles will probably be eliminated completely. Sealed controls and other components will be incorporated in the newer machines, resulting in less trouble. Minor changes in the part sometimes make for much easier machining conditions and a better guarantee of quality. Customers desiring the best production service for their investment should spend more time in studying designs of their parts.

Practical bore finishes, such as honing in one pass with repetitive size control (insuring repetitive dimensional limits and still maintaining the desired microfinish on practically all bored parts) are available and can be established in most production lines.


LACLEDE
Producers of Quality Steel
for Construction and Industry
LACLEDE STEEL COMPANY

PENINSULAR'S Team of 9 Steel Service Centers working together to give you STEEL plus SERVICE

America's Largest Independent Tool Steel Distributor



TOOL STEELS • ALLOYS • COLD DRAWN • HOLLOBAR

FLAT GROUND STOCK • DRILL ROD • PLATE

Over 40 Years of Service to Industry

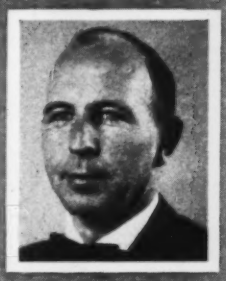
PENINSULAR STEEL COMPANY

24401 GROESBECK • P. O. BOX 3853 • DETROIT 5, MICHIGAN

DREXEL 1-9400 • PRESCOTT 8-2121

DETROIT • CLEVELAND • INDIANAPOLIS • TOLEDO • AKRON • DAYTON • CHICAGO • GRAND RAPIDS • BUFFALO

KENNETH R. BEARDSLEE
General Manager
Metallurgical Products Dept., GE
Detroit



ALLEN SOULER
Automatic Control Engineering
Federal Products Corp.
Providence, R. I.

G. W. HULDRUM
Mgr., Chemical Sales Div.
Shell Chemical Corp.
New York

W. M. WHEILDON
Research & Development Dept.
Norton Co.
Worcester, Mass.

FORUM ON TECHNICAL PROGRESS

Tooling and Gaging

Manmade Diamonds Ready for Exploitation

—KENNETH R. BEARDSLEE

• With the pilot plant phase now behind us and our ability to produce manmade industrial diamonds in volume demonstrated, we firmly believe there will never again be a shortage of diamond abrasive. Industry now has a challenge and opportunity to exploit the cost saving potential of this unlimited supply of diamonds. Sizes are still smaller than we desire, but we are making good progress and soon will be able to fulfill more requirements of industry.

Tooling, generally, is making giant steps. We are working with the cemented oxides and facing exactly the same problems that carbide presented a generation ago. Not only are we going to have to find out about the cemented oxides but we must delve deeper into whether the actual machines we use—or the equipment or the horsepower or the clamping devices—are deficient for the sixties and seventies.

Automatic tooling? How far are we going to go? And along what paths? We must combine the machines, the personnel, the tooling, the resistors and the thermistors, the new metals. We have entered the Age of Space, and it is equally obvious that the standard metals and materials cannot meet the new, the harder standards of heat and stress. Vacuum melting has produced pure metals and alloys hitherto impossible to get. There is no reason to believe that these purer metals cannot in turn be supplanted by other materials not now even commonly used or produced.

So 1959 is really a Threshold Year and not a hallway to the future.

Gages Move to the Machine For Work-Size Control

—ALLEN SOULER

• Look for more applications of gaging at the machine for automatic control of work size. For the most part, applications will involve the in-process gage which measures the work as metal is being removed and automatically retracts the tool when finish size is reached. The other type, the postprocess gage, measures each piece as it is discharged from the machine and, when a size trend is noticed, signals the machine to make corrections so part size is kept within tolerance.

While external and internal grinding operations are particularly suited to automatic control gaging, other operations can employ this method of control (rolling, burnishing, turning, lapping, and drilling, for example).

Machines and measuring systems appear to be adequate. The main problem is the need for additional training on the part of the user to more fully appreciate the factors which can influence high accuracy measurement and to more fully understand these measuring systems when applying them.

Scope of Epoxy Tooling Broadened; Tests Underway

—G. W. HULDRUM

• Still greater advances in epoxy tooling is the bright prospect for 1959. Because of excellent mechanical properties, low shrinkage, and good adhesion to metals, Epon resins have made possible reductions in direct tooling costs as high as 30 per cent and almost 60 per cent in tooling time.

Improved epoxy resin tooling formulations and techniques will further aid design and production engineers in the preparation of master models, patterns, and checking fixtures. Epon resin-wood fiber combinations in conjunction with other fillers and flexibilizers produce more stable master models than those made from mahogany, which is highly susceptible to atmospheric changes.

A new tooling technique, under development, utilizes resistance heating elements and laminated molds in the curing of production parts. This method is much cheaper than making matched metal molds. Elements can consist of

Tooling and Gaging

STEWART G. FLETCHER
Vice President, Metallurgy
Latrobe Steel Co.
Latrobe, Pa.

E. C. HUGHES
President
Bay State Abrasive Products Co.
Westboro, Mass.

LOUIS POLK
President
Sheffield Corp.
Dayton, Ohio

H. J. BALES
Chief, Tool Design
Wichita Div., Boeing Airplane Co.
Wichita, Kans.

nichrome wire, conductive glass cloth, or conductive paper.

For the metal forming industry, Shell has under test a new Epon resin which may provide a tooling medium with superior impact resistance and flexibility. This material will fill a basic need for the tooling of drop hammer and draw dies for large volume production.

Look for Ceramic Cutting Tools To Gain in Three Fields

—W. M. WHEILDON

• Three areas of investigation on ceramic tools have been outstandingly successful, and point to expanded employment.

These are: Heavy stock removal machining of high strength steel (such as 4340 at 200,000 psi tensile strength or above); stock removal on cast iron (such as gear blanks and sheaves, for farm machinery); finish machining of high hardness steel (such as bearing races above Rc 55).

Now that performance consistency has reached a more satisfactory level, the single most influential property of ceramic tools is probably their relative resistance to impact. Sufficient data have been assembled to indicate that potential improvement is needed, possible, and can be expected in this area within the next few years.

Also, some information has been generated to indicate that the future may see satisfactory brazing for ceramic tools on jobs where a clamp-type holder is impractical.

Tool Steels Tackle Tough Metal Jobs

—STEWART G. FLETCHER

• The tool steel industry is taking a careful look at the potentialities for vacuum melting. Vacuum melting of aircraft bearing steels and other specialty steels is done on a production basis. Some compositions used for these applications are modifications of regular tool steel grades.

Vacuum melted steels for tooling can be produced in most analyses and are now available in limited quantities both as induction melted and consumable electrode melted products. Advantages over regular air melted tool steels can only be established by performance testing on the job, some of which is now in progress in various industries.

Improvements made in tool materials recently include the free machining tool and die steels, prehardened hot work steels and high vanadium superabrasion resistant steels.

Requirements of the aircraft and missile industries for high strength steels to withstand elevated operating temperatures has promoted new uses for tool steels, notably high speed types for elevated temperature bearings and hot work die steels for supersonic airframe structures.

Grinding Faces New Problems Brought About by New Jobs

—E. C. HUGHES

• Production management is insisting that costs be lowered in grinding and finishing. Parts must be ground faster with closer tolerances and with a greater degree of safety.

New, high temperature resistant superalloys are making demands on the grinding wheel industry. The increased trend toward complete automation presents further grinding problems. The increased use of honing to produce flawless surface finishes is another mounting abrasive problem.

Those challenges are being met by more intensive research and product development.

Some of the latest developments are: New artificial abrasives with improved grinding characteristics; new combinations of abrasives and bonds; grinding wheels capable of greater speeds; successful utilization of manmade diamonds in grinding wheels; reinforcing materials such as nylon, glass, and cotton to withstand the rigors of grinding; intensified effort on quality control throughout the entire manufacturing process; increased use of automatic electronic equipment to assure a more nearly perfect duplication of grinding wheel specifications from order to order.

Equipment on Way for Tape Controlled Gaging

—LOUIS POLK

• Industry's attitude generally indicates a stronger trend toward upgrading metalworking and inspecting.

Scheduled for delivery this year are tape controlled measuring machines, which will focus attention on a system destined to become increasingly important. Positions of gaging styluses and part orientation are controlled by tape information. They produce printed tapes (like cash register receipts) showing size deviation for each dimension or the difference between two dimensions.

Technological progress in automatic gaging and assembly is proceeding rapidly with recent developments covering high-speed pneumatic gage heads that permit inspection rates far faster than present machine cycle times, and smaller air gage spindles.

Electronic gaging is proving highly satisfactory for automatic multiple dimension inspection, especially suitable where data handling such as recording and computing is required.

Aircraft Tooling Progress Demands More Research

—H. J. BALES

• Tooling for sandwich panels is expensive and time consuming. Research toward reducing these costs has not been

(*Please turn to Page* 334)

BIG, NEW ADDITION

to SIMONDS' COMPLETE LINE of "Red Tang" Files

NEW MULTI-KUT

FLAT

This MULTI-KUT FLAT file is similar in shape to the Regular Flat File. Fast cutting, it leaves a smooth finish and gives good results on any fileable material. Furnished in 8", 10", 12" and 14" lengths.

NEW MULTI-KUT

HALF-ROUND

This MULTI-KUT HALF ROUND combines two exclusive SIMONDS file designs: Multi-Kut on the flat side, Spiral Cut on the radius side, resulting in rapid, smooth finish filing of either flat or concave surfaces or for rounding out holes. Furnished in 8", 10", 12" and 14" lengths.

NEW MULTI-KUT

SQUARE

Cut on all four sides and tapered toward the point, this fast cutting MULTI-KUT SQUARE file is especially useful in slots, keyways, splines, square holes and general surface work. Furnished in 8", 10", 12" and 14" lengths.

The New Simonds'

MULTI-KUT FILES

...with Criss-Cross Design

The Simonds' line of files — files that cut fast and smooth, last longer; files that bring *smiles of satisfaction* are now even more complete with the addition of Simonds' new design Multi-Kut — in three shapes, four lengths.

The new diamond formation chip breaking grooves and varied shapes make the Simonds Multi-Kut an extremely useful all-around file for maximum stock removal, smooth finish and long life on any fileable material.

For Fast Service from Complete Stocks
Call your
SIMONDS Industrial Supply DISTRIBUTOR

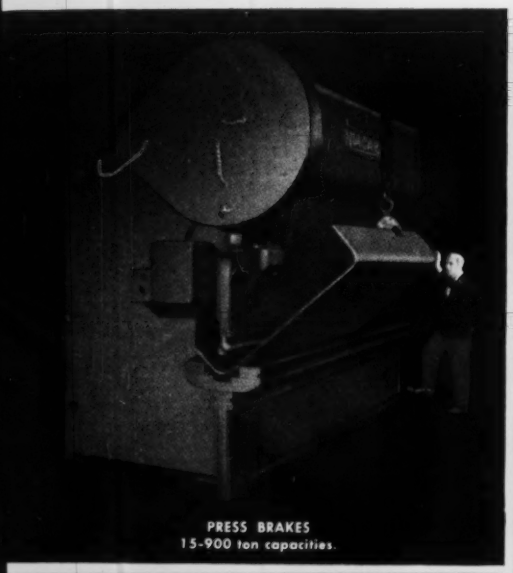
INDUSTRIAL DISTRIBUTION — THE RIGHT HAND OF PRODUCTION

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

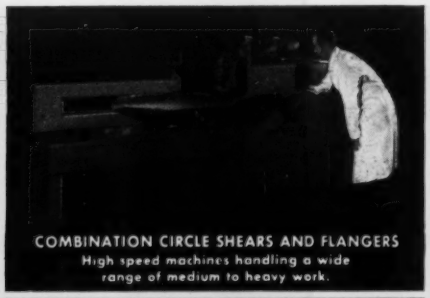
Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon . . . Canadian Factory in Montreal, Que. . . . Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

In plate or sheet metalworking...

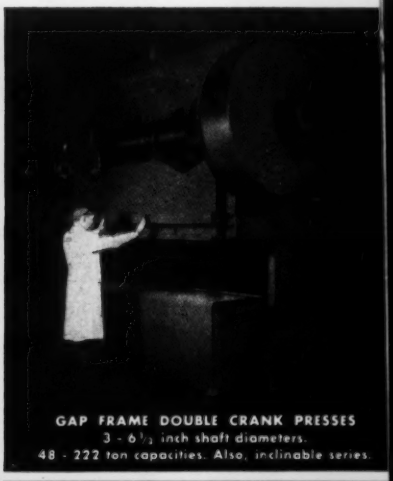
NIAGARA MACHINES CAN



PRESS BRAKES
15-900 ton capacities.



COMBINATION CIRCLE SHEARS AND FLANGERS
High speed machines handling a wide range of medium to heavy work.

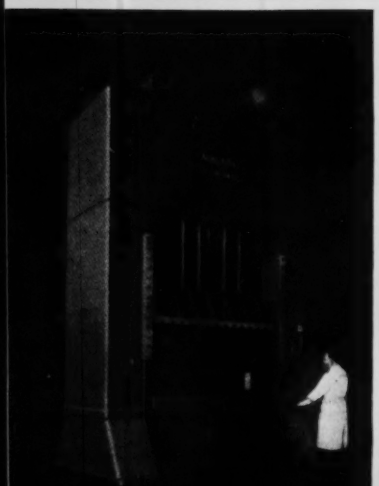


GAP FRAME DOUBLE CRANK PRESSES
3 - 6 1/2 inch shaft diameters.
48 - 222 ton capacities. Also, inclinable series.

BENDING ROLLS
Hand and power driven for a wide range of lengths and thicknesses.

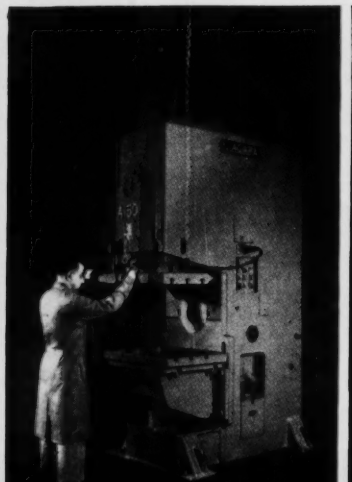
STRAIGHT SIDE SINGLE & DOUBLE CRANK PRESSES
50-500 ton capacities.

SINGLE CRANK OPEN BACK INCLINABLE PRESSES
1 1/4 - 7 1/2 inch shaft diameters.
7 - 250 ton capacities.



STRAIGHT SIDE ECCENTRIC GEARED PRESSES
One, two, and four-point suspension.
100-1250 ton capacities.
Standard and equipped for automation.

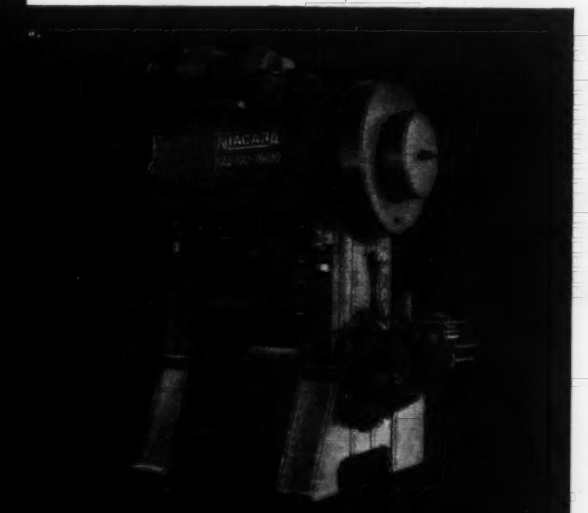
FRONT-TO-BACK CRANKSHAFT OPEN BACK INCLINABLE PRESSES
Standard and automation models.
45-200 ton capacities.



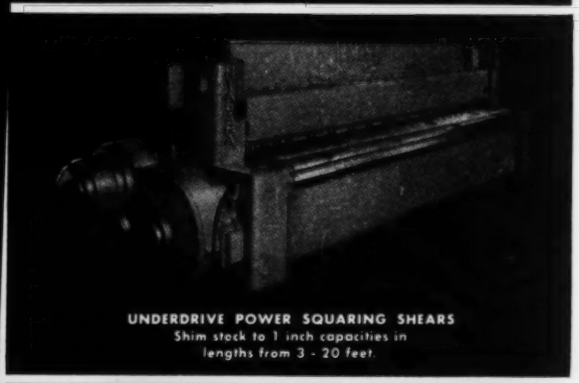
FRONT-TO-BACK CRANKSHAFT ADJUSTABLE BED PRESSES
Standard and modified models.
22-150 ton capacities.

FRONT-TO-BACK CRANKSHAFT DEEP THROAT PRESSES
22-150 ton capacities

DO THE MOST* FOR YOU



AUTOMATIC FEED HIGH PRODUCTION PRESSES
60-300 ton capacities.



UNDERDRIVE POWER SQUARING SHEARS
Shim stock to 1 inch capacities in lengths from 3 - 20 feet.

NIAGARA

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

POWER PRESSES • PRESS BRAKES • POWER SQUARING SHEARS • ROTARY MACHINES • SLIP ROLL FORMERS • POWER ROTARY SHEARS • DRUM MAKING EQUIPMENT • ELECTRONIC AUTOMATIC WELDERS • GROOVERS AND SEAMERS • HAND OR FOOT OPERATED SHEARS • FOLDERS-BRAKES • LEVER SHEARS AND PUNCHES • HAND TOOLS

* MOST EXTENSIVE LINE:

From giant, power-operated machinery to small hand tools

* MOST ADVANCED DESIGNS:

Years ahead in performance through forward-thinking engineering

In the world's largest automotive and appliance plants or the smallest of sheet metal shops, Niagara machines and tools are usually at work "in force."

Batteries of giant presses are teamed up with speedy ring and circle shears. Massive, rugged press brakes stand side-by-side with powerful bending rolls and squaring shears. Versatile lever punches, rotary machines, groovers and seamers . . . all operate together to produce a better product at lower cost. The Niagara lines are "companion lines" of metalworking machines and tools that work together. A Niagara-equipped shop or plant is years ahead in quality and volume of production.

Whatever you require — power presses or hand tools — Niagara is the line that can do the most for you. It is the most complete in the industry . . . the most advanced in engineering. You can consult a Niagara representative with complete confidence of unbiased recommendations. Niagara has the right machines and tools for your requirements.

BRING YOUR FILES UP-TO-DATE WITH INFORMATIVE NIAGARA BULLETINS

A diversified and extensive list of machines and tools make up the famous Niagara line. Some of the principal types are illustrated. Be sure that you have the latest data on the ones that apply to your work. At your request, specific Bulletins will be mailed promptly.

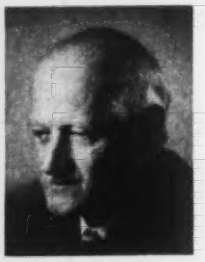
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

DISTRICT OFFICES

Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia

Distributors in principal U. S. cities and major foreign countries

Tooling and Gaging



PHILIP M. McKENNA
President
Kennametal Inc.
Latrobe, Pa.

EDWARD KIBBITT
Mgr., Stupalox Project, New Prod.
Branch R & D
Carborundum Co.
Latrobe, Pa.

HARRY E. CONRAD
Executive Secretary
American Society of Tool Engineers
Detroit

too fruitful to date. One avenue appears to be the use of numerically-controlled profiling machines for producing contoured sandwich panel tooling. We have been able to establish limited three-dimension computer techniques to permit the preparation of control tapes for three-dimension machining. This breakthrough in programming not only will lower costs, but will also permit tooling to be built to the reduced tolerance requirements necessary for high-performance aircraft.

Every tested means of economical tool fabrication will be needed. It will be necessary to overcome the inertia created by clinging to established techniques, to press for economical tooling production and to develop the tooling needed to overcome the three most difficult areas of high-performance aircraft tooling. These three areas I define as: The joining of sandwich panels by welding or brazing; welding of thin high-strength metal sheets to one another and to structural sections without leaving irregularities detrimental to aerodynamic smoothness; and production machining techniques to permit rapid machining of high-strength steel and alloy forgings, extrusions, and structural sections.

This challenge to tooling will not be overcome this year, but I foresee great progress in this direction by the time another year rolls around.

Carbide Inserts Offer Performance Consistency

—PHILIP M. McKENNA

• I see 1959 as a threshold year to a decade of efficiency in carbide use such as we have never approached in the past.

Application of single use indexable cutting inserts, or throwaways, has had quicker acceptance than any other tooling innovation in history. The uniformity of performance per cutting edge will show as much saving as the direct cost per cutting edge, and freedom from variations due to grinding, brazing, tool geometry, and ground-in chip breakers eliminates much of the tool troubleshooting of the past.

The trend is toward greater automation with self-regulating machine tools. Such systems depend heavily on the uniformly dependable performance of the cutting edges. Tools must not only average a good performance, they must have a high degree of consistency in performance, to be practical where tool changes are on a prescheduled program.

Cutting edges must be supported properly, too, to do a good job. With its 90 million psi modulus of elasticity, tungsten carbide provides such support on bars, quills, and toolholders which must reach into deep recesses of the workpiece. I look for much greater use of carbides in the near future, as a stiff structural material.

Ceramic Cutting Tools Get Ready for Tougher Jobs

—EDWARD KIBBITT

• Significant advances in ceramic tool application on heavy duty and shock cuts were made last year. Satisfactory milling at ½ in. depth of cut on cast iron has been experimentally successful. Several instances were reported of interrupted cutting with ceramic single-point tools on production jobs. This trend should continue into 1959.

Present ceramic research effort is directed toward: Developing more economical methods of manufacturing suitable to ceramics, providing more versatility in manufacturing techniques to provide for larger sections and more intricate shapes, and increasing material strength and toughness where required.

Development engineering now, and for 1959, is directed toward practical ceramic material application on a broader base. Improved geometric designs for ceramic cutting tools are being developed and will be introduced soon. Parts and products subject to wear will have increased attention as it becomes apparent that ceramic materials will improve performance characteristics.

This year will see technical progress take the form of further development and application of the oxides and other ceramic materials, such as nitrides, silicides, borides, and carbides of various elements, for increased resistance to high temperature, thermal shock, shock, erosion, corrosion, wear, or various combinations of these conditions.

We Must Be Ready for Technological Challenges

—HARRY E. CONRAD

• Numerical or tape control, electronic and chemical machining are only a few of the new tools that will be commonplace in the near future. It is well within the realm of probability that even these new processes and methods will be obsolete in their present form within a few short years.

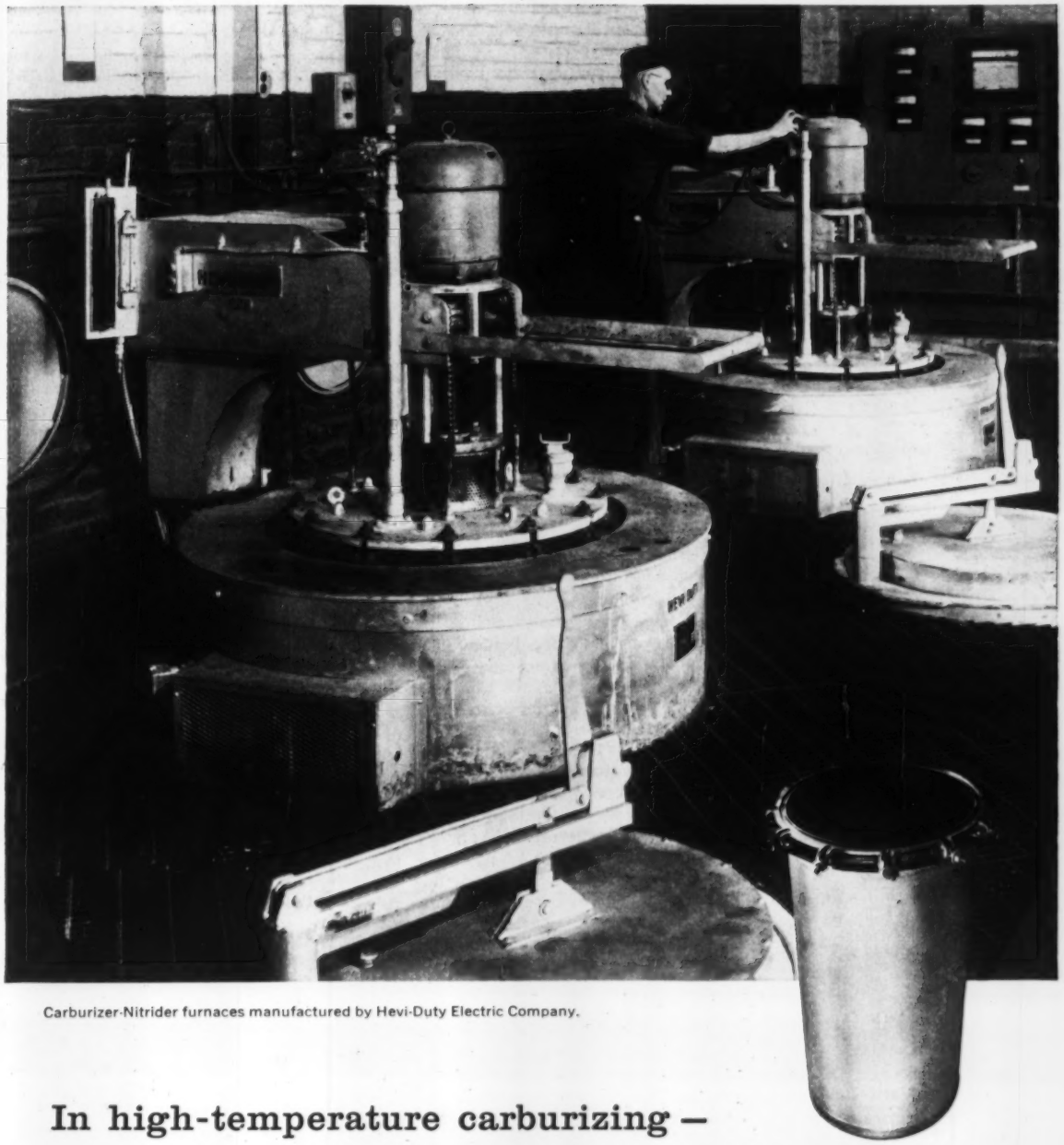
Looking at our industrial growth of the future as it involves the various phases of tool engineering, there are two essential elements dealing with human beings that cannot be overlooked.

One is education and the other sociological.

The rapid rate of inflation is a constant threat. To develop the new capital required to maintain our present standard of living, and increase it, we must raise our rate of productivity.

Educated knowledge will be the weapon of the future tool engineer. The individual must be completely prepared with the necessary knowhow when the challenge presents itself. Full utilization of the time off the job will be essential to keep up to date with technological progress. This applies to both the employed and the student. Further, it is conceivable that industry itself will have to recognize the need and participate directly by providing highly specialized within-plant educational facilities.

Diversification and decentralization of



Carburizer-Nitrider furnaces manufactured by Hevi-Duty Electric Company.

In high-temperature carburizing – Thermalloy* centrifugally cast retorts last longer!

The special requirements of the new high-temperature carburizing process demand retorts of superior heat-resisting qualities . . . qualities inherent in Thermalloy centrifugally cast alloys.

"The greater density of centrifugally cast alloy retorts provides superior strength at high temperatures, thus increasing the anticipated life of the retort when used for high-temperature carburizing," says Arthur Frank, V. P., Engineering, at Hevi-Duty Electric Company. Hevi-Duty is a leading maker of electric heat-treating furnaces and a pioneer in high-temperature carburizing.

If you are using or intend to use the new process, be sure your retorts will stand up. Use Thermalloy centrifugally cast, heat-resistant alloy retorts. *Reg. U.S. Pat. Off.

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION • Elyria, Ohio

Tooling and Gaging

JOHN DELMONTE
President
Furane Plastics Inc.
Los Angeles

LEIGHTON A. WILKIE
Chairman
DoAll Co.
Des Plaines, Ill.

FREDERICK S. BLACKALL JR.
President & Treasurer
Taft-Peirce Mfg. Co.
Woonsocket, R. I.

W. B. DUNCAN
Chairman
Wesson Co.
Ferndale, Mich.

manufacturing, coupled with a shorter workweek will create a different way of life for many people. Many things will be affected, creating many problems outside the technological field, but related thereto which will require a keen appreciation of human behavior in the technological decisions that will have to be made.

Plastics Set To Grow as Partner in Metalworking

—JOHN DELMONTE

• Among the significant advances in plastics technology are those fortuitous combinations with metals which lead to superior materials of construction. Steel and aluminum, in both powder and fiber form, are "alloyed" with plastics to yield materials of superior wear resistance, better thermal diffusivity, and better dimensional stability.

Restrictions on casting thickness are being removed and more massive and functional pours are being accomplished. This portends a trend toward cast tools and fixtures of plastics and metal powders as distinct from the fabricating and laminating procedures.

Still in the future are those combinations where metals form the matrix and plastics the energy absorbing means. Ablation has already been considered for rockets and satellites to preserve the functional status of metals. Reduced to industrial concepts, porous metal structures may be impregnated with a plastic material not only for self-lubrication, but also as a means of absorbing heat energy, as an anticorrosive measure, and as a heat sink to counteract extreme low temperatures.

Chipless Forming and Precision Show Promise; New Goals Set

—LEIGHTON A. WILKIE

• Two trends are clearly delineated. Both concern the conservation of vital resources; and they will probably make marked changes in manufacturing methods in the next few years. One is the emphasis on metal shaping or forming with a minimum of wasted material. The other is the tightening up of tolerances so that scrap losses can be reduced and service life of manufactured articles increased.

Although various chipless forming methods are in use and others in development, industry is producing 15 million tons of chips at a cost of over $10 billion a year in the U. S. alone. The enormity of this makes the development of more efficient methods incumbent upon the entire metalworking industry. Fortunately, much is being done.

The second of these trends is also well defined. A program at the National Bureau of Standards is attempting to remove an obstacle to progress. The goal is to reduce the smallest practical measurement limit from two millionths of an inch to one-tenth of a millionth of an inch.

Gaging Trend Is Toward Accuracy, Readability

—FREDERICK S. BLACKALL JR.

• Smaller capsule type pick-up heads for both air and electronic gaging circuits are now being applied to low cost inspection setups on small lot production.

Comparator and measuring type gages, utilizing mechanical, air, or electronic circuits to amplify the measured variation, will probably find increased use in many areas where production quantities are sufficient to warrant their purchase. The trend in all such instruments will be toward greater accuracy and readability. In the case of the electronic amplification circuit, the use of the transistor to replace the vacuum tube will give a more compact unit with less danger of heat generation, due to the low current input. Such units should be less fragile.

Fixed gages will continue to be used widely, especially where the production rate does not justify more rapid mechanized inspection. The technological trend here would be towards gages of greater precision and improved wear life.

Throwaway Carbide Inserts Move to More Jobs

—W. B. DUNCAN

• The most marked trend in metalworking today is the expanding use of throwaway carbide inserts. This applies not only to the single-point tool, where throwaways had their start, but now also to the multiple-point tool field. Reports indicate a particularly strong trend towards use of throwaways in milling cutters, boring tools, and multidiameter, multioperation cutters.

Experience has demonstrated that quite heavy cuts can be taken with multiple-point tools. As a result, throwaway type milling cutters are finding increasing application for both roughing and semi-finishing.

Even more important to industry, however, are the opportunities which throwaways open up through combining of multiple operations in a single tool. Such tools, at one pass, will perform such varied operations as multiple diameter boring plus facing, chamfering, and other operations.

One of the surprises to most companies who go into throwaways—particularly for multiple-point tools—is the

Introducing Allied's

IRILAC™ #1000

New Clear Protective Coating for All Metals . . . as safe and easy to handle as Water!

New method of protection incorporates corrosion inhibitors in a water-soluble polymer base. Dries to an extremely thin, tough, durable coating—clear in color. Does not chemically affect base metal or any post-treatments. Used as a protective treatment alone or to enhance value of post-treatments.

Allied's new Irilac #1000 is a concentrated solution of a water-soluble polymer with built-in complex corrosion inhibiting materials. It was developed to answer the needs of the metalworking industry for a non-conversion process that will provide corrosion resistance and resistance to fingerprinting and abrasion on base metals and electrochemically or chemically finished surfaces—without changing the appearance of the metallic surface.

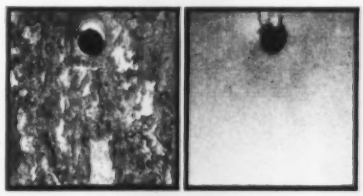
There are no hazards involved—Irilac is non-fuming, non-toxic, and requires no special fire prevention measures.

THE PROCESS

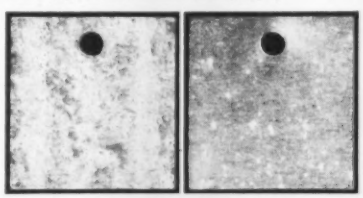
Irilac #1000 is diluted with water to provide a simple one-pass working solution. It is then applied by dip, brush or spray and forms a coating that quickly *bonds* to the metal surface without reacting with the surface.

THE PROPERTIES

The resulting coating is clear, transparent, thin yet durable. It has excellent water-resistant properties, and can be rubbed, handled and subjected to rough treatment. The surface to which Irilac has been applied is not altered—in fact, the transparent coating brings full tone to colored surfaces and clarity to iridescent surfaces. The water-thin physical characteristic of the solution means that the coating provides protection in recessed areas that are difficult, if not impossible, to protect with other methods.



STEEL PANELS: bare (left) and coated with Irilac (right) after 8-hour salt spray.



ALUMINUM PANELS: bare (left) and coated with Irilac (right) after 168-hour salt spray.

WHERE IRILAC CAN BE USED

Irilac #1000 can be applied to *any* metal—wet or dry—treated or untreated. All metals can be processed in *one* operation in the same solution. It can be applied in conjunction with any process—over Iridite, anodized, phosphated surfaces, black oxide, etc. Surfaces treated with Irilac provide a good base for paint.

APPLICATION ADVANTAGES

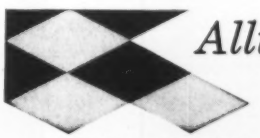
No other process or material available for the protection of metals offers all the application advantages found in new Irilac #1000:

1. It can be applied to *any* clean metal simply by dip, brush or spray. No special equipment is required.
2. Saves time—just apply and dry—no reaction time required.
3. No hazards involved—no exhaust or special fire protection equipment is required. Irilac is non-fuming and non-toxic.
4. Saves space. Presents no disposal problem. Low in first and final costs.

Because of its versatility and complete safety, Irilac has unlimited uses. For example, it will protect aluminum furniture, brass hardware and fixtures, steel parts of all types, zinc castings, etc. In fact, any base metal or plated surface, or those treated with electrolytic or chemical post-treatments, can be improved or enhanced with Irilac.

IRILAC #1000 MAY BE THE ANSWER TO YOUR PROTECTION PROBLEM

Our development staff will be glad to work with you to determine the significant benefits Irilac can offer you. Simply send us some parts and let us show you what Irilac can do. No obligation, of course.

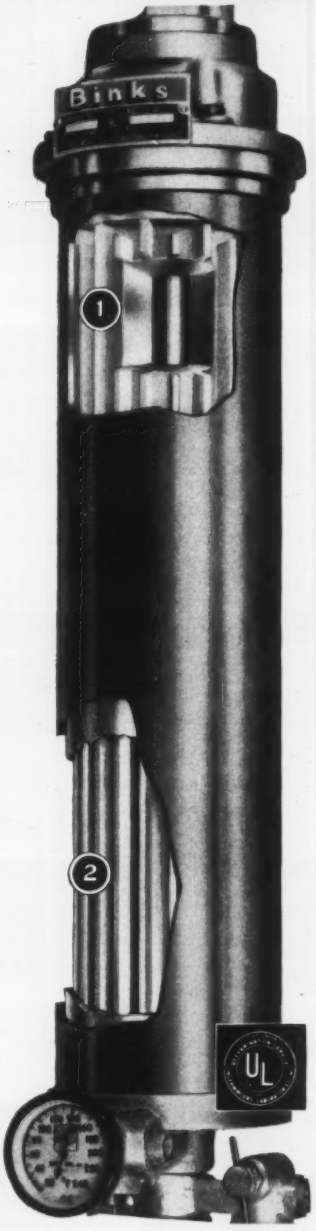


Allied Research Products, Inc.

4004-06 EAST MONUMENT STREET
BALTIMORE 5, MARYLAND

Manufacturers of **IRIDITE®, IRILAC™, ARP® Brighteners and Plating Chemicals**
West Coast Licensee: L. H. Butcher Co.

Today all other PAINT HEATERS became obsolete



1 ALL NEW CENTER HEAT

— Saves you 50% to 75% on operating cost. A 1500 watt element in the new Binks paint heater does the work of 3000 and 6000 watt units found in other heaters. There are two reasons why. First, the heat is in the center. It has to heat paint. Second, the new paint tract has an enormous heat contact area. Low heat does the work of high heat . . . actually eliminates a primary cause of bake-out.

2 ALL NEW 27 FOOT LONG PAINT TRACT

— Multi-finned tract design packs over 3½ sq ft of uniformly heated surface into a 15" height and 3½" diameter. You attain highest viscosity control at delivery rates up to 30 oz per minute. Temperature is thermostatically controlled at 150°F. The entire paint tract removes for easy maintenance.

4 MODELS U/L APPROVED

Available for 115v or 220v operation, with or without paint circulating pumps.

SEND FOR FREE BULLETIN

Describes the exclusive technical features of this all-new Binks paint heater. Available from your nearest Binks industrial distributor or write direct to the address below.

Ask about our spray painting school
Open to all—NO TUITION—covers all phases

Binks
EVERYTHING FOR SPRAY PAINTING

SPRAY GUNS

SPRAY BOOTHS

NATIONWIDE SERVICE

Binks Manufacturing Company
3122-30 Carroll Avenue West, Chicago 12, Illinois

9038

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

Tooling and Gaging

HARRY CONN
Chief Engineer
Scully-Jones & Co.
Chicago

striking reduction achieved in tool cost per piece even though the new tools are more complex in nature and higher in initial cost.

Tool Change Time Is Critical Cost Factor

—HARRY CONN

• The direct need in metal machining is to apply economic analysis to operating expenditures in a more thorough and realistic manner than has been done.

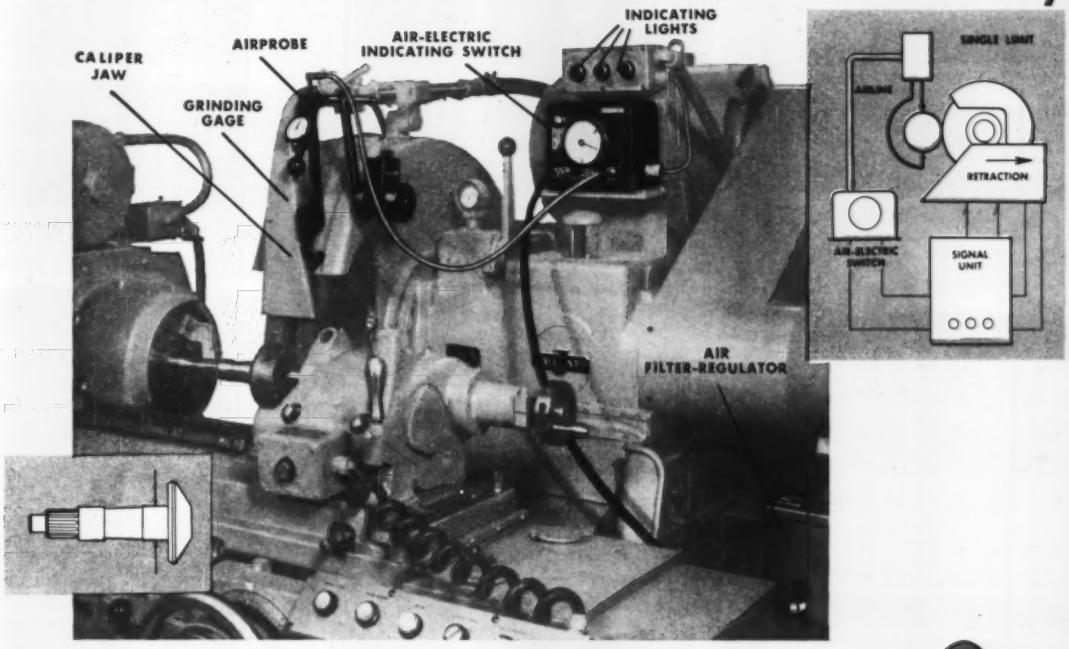
Every time a tool is inserted into a machine, there are at least three costs: Tool changing, tool grinding, and perishable or tool depreciation. The sum of these three is tool replacement cost. The incorrect method of calculating tool replacement cost is frequently the direct reason for lower efficiency of high production equipment.

The universal practice of computing tool changing cost is by multiplying the number of minutes needed to change tools by the cost of direct labor per minute. Tool changing cost should be computed on a basis of minutes needed to change the tool times "what the machine is worth per minute," which is the value of production lost.

If a machine at 80 per cent efficiency turns out 100 crankcases an hour, performs 350 machining operations on each part, and the part is valued at $18 at that stage of production, the production value of the machine is $1800 an hour or $30 a minute. If it takes 2 minutes to change a tool, the real cost of changing tools is $60 of lost production value —not about 10 cents for direct labor.

Not using a realistic approach has resulted in modern machines being equipped with horse-and-buggy design toolholders that multiply the tool changing cost.

MODERNIZE YOUR PLAIN GRINDING . . . *Economically!*



Automatic Control Gaging improves your grinding operation 3 ways . . .

1 It controls on the basis of finish size *only*, thus overcoming the disadvantages of timed cycle or fixed stop grinding. Wheel wear, O.D. variation in work to be ground, "give" in many of the machine elements, and flexing of the work, no longer affect accuracy and piece-to-piece uniformity of the finished part.

2 It controls *automatically*, thus you eliminate any errors caused by operator fatigue, inexperience, or inattention. The Federal automatic control gage never tires, will hold part size to .0001″ or better on a good machine, and is easily adjusted to control different sizes of work. Its air-electric system overlooks minor surface irregularities which confuse size readings of other gages.

3 Automatic control gaging makes it possible for one operator to handle two grinders performing the same or different operations. Here's an actual case history of direct labor cost savings:

	MEN	MACHINES	COST PER PIECE	PRODUCTION RATE pieces per 8 hr. shift
BEFORE			$.03585	1344
CONTROL GAGING INSTALLED				
AFTER			$.01526	1386

SAVINGS (per piece) . . . . . $.02059
RATE INCREASE (per shift) 42
TOTAL SAVINGS (per shift) $28.59
EQUIPMENT COST AMORTIZED — 60 DAYS

HOW IT WORKS

The Federal automatic control gage measures the work continuously *as metal is being removed* and automatically retracts the wheel the instant finish size is reached.

EASY TO INSTALL

This standardized Automatic Control Gage (Model 133M-103 illustrated) is stocked for speedy delivery. Only a few components to install. Easily applied to any plain grinder having hydraulic wheel slide. Can also be used in connection with wheel slide stop to *additionally* provide spark out.

Federal control gages are also available through machine tool manufacturers for control of either plain or I.D. grinders and are supplied as part of the grinder package. When discussing machine tool requirements, be sure to specify FEDERAL gaging. Federal maintains close engineering alliance with leading machine tool manufacturers. They, too, will be glad to discuss automatic control gaging with you.

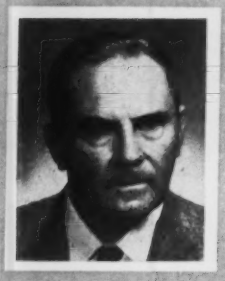
For more information, contact the nearest FEDERAL representative or write . . .

FEDERAL PRODUCTS CORPORATION
9211 Eddy Street, Providence 1, R. I.

Ask **FEDERAL** *First*

for recommendations in modern gages . . .

Dial Indicating, Air, Electric, or Electronic – for Inspecting, Measuring, Sorting, or Automation Gaging



T. E. PIPER
Technical Director, Management Div.
Convair Div., General
Dynamics Corp., San Diego, Calif.

VASIL PHILIPCHUK
Manager, Special Products Dept.
National Northern Corp., subsidiary of
American Potash & Chemical Corp.
West Hanover, Mass.

C. H. SMITH JR.
President, Steel Improvement &
Forge Co., Cleveland

PRESTON L. HILL
Colonel, USAF
Chief, Mfg. Methods Div., AMC
Aeronautical
Systems Center, Wright-Patterson
Air Force Base, Ohio

FORUM ON TECHNICAL PROGRESS

Forming

Explosive Forming Can Outmode Several Conventional Methods

—T. E. PIPER

• Within the next five years, powder material parts may replace casting, forging, extruding, and machining. Ductile ceramics may be possible by increasing the velocity and pressure of pressing and extruding.

Supersonic and hypersonic vehicles mean complex parts and within five years, new structural parts capable of resisting 1500° F for prolonged exposure and 2500° F for a few minutes. They must have weight-strength characteristics at operating temperatures far better than present airframe materials used at ordinary temperatures.

High temperature metals (molybdenum, tantalum, columbium, beryllium, ceramics, and cermets) are harder, more brittle, and less ductile than steel. Today's machining practices for such metals are out of the question.

For example, steel forgings by today's standards require 77 per cent reduction in weight by machining. Total cost of the finished part is four times more than that of parts from a light alloy. High-temperature resisting materials would cost many times that amount for identical parts. It's time to get out of the chipmaking business.

High-energy-rate machines, capable of extruding, forging, or forming metal, ceramics, cermets, and powdered metals into precision shapes is a requisite for the Space Age materials. The born-to-shape objective can only be accomplished by working metals at 400 fps and pressures up to 1.5 million psi. Such machines will revolutionize metalworking. High-energy-rate forming is one of the real advances of the last 25 years.

Extrusion of steel by high-energy rates produces parts with improved surface finishes, precision tolerances, reduced web thicknesses, and smaller fillet radiuses. Little die heating was experienced with or without lubrication.

Powder metallurgy, one of the oldest metalworking processes, has never been able to produce 50 lb aircraft parts because no suitable presses were available. We believe high-energy-rate machines will make such parts possible.

The born-to-shape concept should lower costs and increase reliability. The most ideal materials will then be engineered to perform a functional task.

Widespread Use of Explosives To Come by 1965

—VASIL PHILIPCHUK

• Explosives will take on an additional meaning for man. They will be viewed as tools for pressing, cutting, welding, shaping, cold working, sizing, flanging, embossing, bonding, locking, threading, molding, riveting, joggling, and cladding.

By 1965, production of parts, required for daily living and research, will be a fact.

Various industries will operate explosive shops. Such facilities will make parts more economically, or those which are impossible to produce today.

Explosive processes will benefit both large and small firms. They will relieve the need for large expenditures for capital equipment.

Personnel will be trained by those expert in handling explosives or licensed by state authorities.

New Techniques Are Needed To Handle Refractory Metals

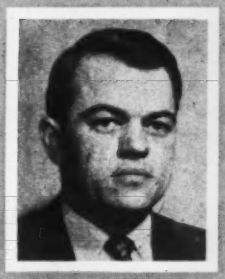
—C. H. SMITH JR.

• The next two or three years will see many changes in forging, particularly in components for the aircraft and missile industries.

During the coming year, refractory materials will assume great importance. New techniques must be developed for rapid heating and deformation of such metals. New and radical departures from conventional machining or finishing must be devised. New and better die materials must be developed.

This should be a year for major advances in extrusions. Orifice extrusions

ALBERT J. SARKA
Director of Research & Development
Wean Equipment Corp., Cleveland



RICHARD B. STRIBLEY
Manager, Phosphate Coating Div.
Detrex Chemical Industries Inc.
Detroit

CARTER C. HIGGINS
President, Worcester Pressed
Steel Co., Worcester, Mass.

ALFRED H. PETERSEN
Group Engineer, Producibility Methods
Calif. Div., Lockheed Aircraft Corp.
Burbank, Calif.

have already been well accepted in the nonferrous materials, and we will see orifice, blind, and secondary extrusions used in a wide variety of materials. The trend will be definitely toward less machining, higher material utilization, and retention of forged outer fibers.

Inexpensive protective coatings to prevent decarbonization will find greater use. More precision will be specified in all classes of forgings.

Air Force To Switch Emphasis To Small, Quality Production

—COL. PRESTON L. HILL

• Change is today's most important issue to the Air Force. Its true significance lies in the "thinking process" behind tomorrow's systems.

Today's practices will not solve tomorrow's problems. Radically new, efficient production methods must be brought about.

Tomorrow's weapon systems cannot be built to today's standards or its methods. Advanced aircraft as well as missiles will operate under considerably more severe environmental conditions. Future vehicles may be of structures built from close tolerance products like honeycomb.

While quality must improve, quantity will decrease. Today's tons of forgings, extrusions, sheets, or vehicles will become orders for a few items of unprecedented quality—with definitely shortened lead-time. Everyone must realize that the era of quantity production for the Air Force is rapidly disappearing.

Increased operating temperatures necessitate the use of outstanding refractory metals, as well as tough superalloys.

We must reduce forming costs of such metals. One promising reduction method is explosive shock waves. All that is needed to form a thin sheet is a suitable container (an ice cream container has been used), a transmitting medium like an explosive charge, and some open space. Forging, extrusion, and billet separation look equally attractive.

Says Cost of Materials Will Outshadow Labor Rates

—ALBERT J. SARKA

• We feel that managers will want tomorrow's conventional presses to offer more strokes per minute and more accurate feeds. The cost of material, rather than labor, will be one of the main things to watch.

There is a need for better roll feeds, using the overrunning clutch and brake combination. Their inherent inaccuracies caused by speed and brake temperature changes will encourage a move toward the continuous feed-moving die combination. One evidence of such a trend is the roll forming of tubes in conjunction with a flying cutoff.

Finishing Customer To Value Quality More Than Price

—RICHARD B. STRIBLEY

• New methods, materials, and processes must appear in the near future. For example, new and better paints have appeared faster than the methods and materials for removing them. Inexpensive, inefficient strippers are going to be replaced by those of high quality. The net result is more economy.

Industry must find better handling methods and tighten up on quality controls. Price is important, but quality products are finding more buyers. Suppliers can help meet that demand by improving shipping, storage, and packaging methods.

New testing methods must be developed and standardized throughout industry.

Much work is being done to control rust and corrosion, but much more effort is required before the problem is licked.

List Six Top Developments Slated for Near Future

—CARTER C. HIGGINS

• These are the important developments in the near future:

1. A new method of compounding metal powders, leached from scrap materials, promises better materials for stampers. They can be rolled into solid or coated copper-nickel strip.

2. More progress will be made in ceramic coating of stampings to withstand 3000° F. Parts that used to require heavy sections made of costly materials can be stamped of lighter metals that reduce costs.

3. High energy rate forming is much faster than press forming. Sudden impacts obtained from cartridges and explosive charges offer new shapes in heat treated and otherwise refractory metals. There is no springback, and equipment is simple.

4. A standard glossary of stamping terms is due for completion in 1959.

5. Stampings combined in layers will replace parts made by other methods.

6. Several substantial companies will make rather than buy stampings. If their experience is satisfactory, this could be an important trend.

Hot Airframes Have Helped Progress in Forming

—ALFRED H. PETERSEN

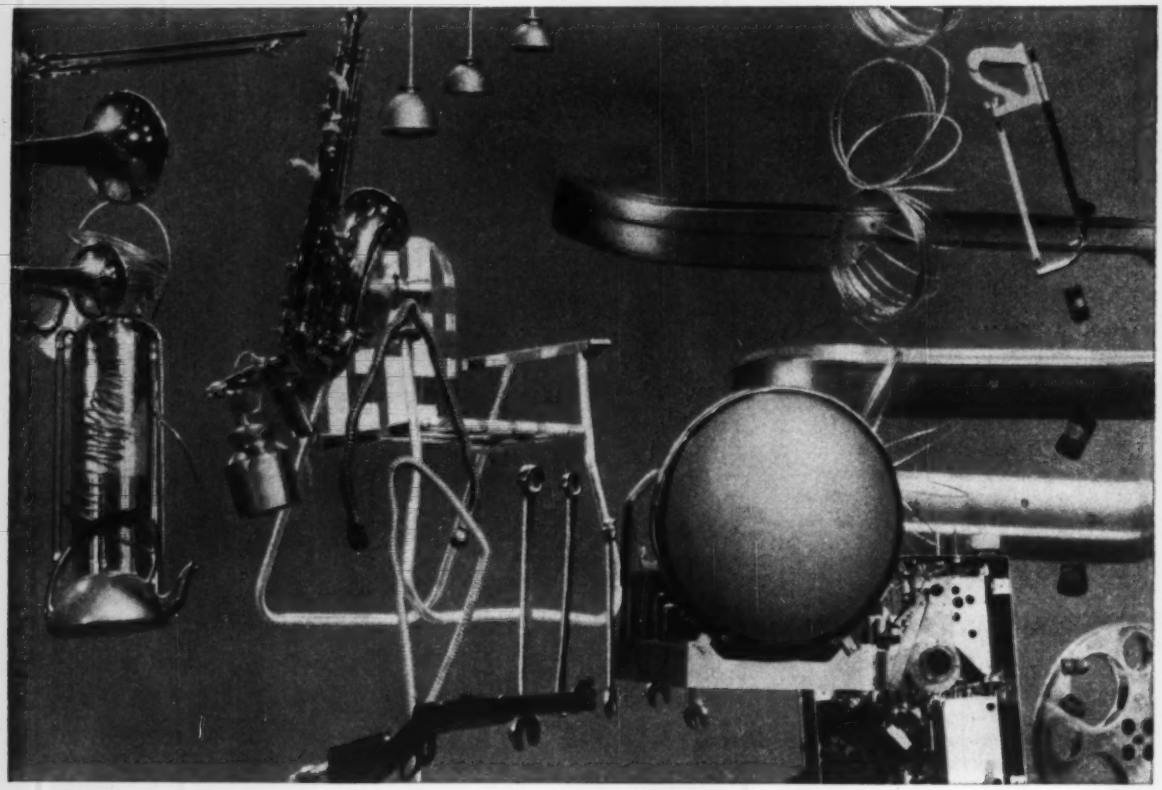
• The emphasis for the next few years is going to continue on the "hot" airframe.

Transports will encounter 700° F, and bombers, interceptors, and missiles will run up to 3500° F.

Beryllium, tungsten, molybdenum, vanadium, chromium, tantalum, and columbium are being worked on to find a way to produce bars, sheets, tubes, and forgings and to reduce objectionable characteristics by alloying. Rapid oxidation,

(*Please turn to Page 344*)

Columbia-Southern Trichlor provides economical, efficient



Degreasing units are available that will clean anything from multi-ton generator stators to tiny watch gears.

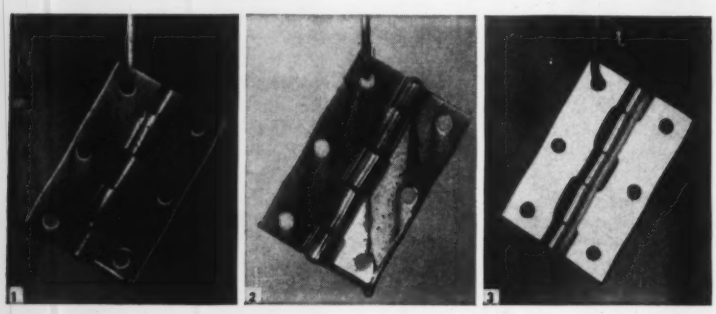
The modern stabilizer in Columbia-Southern Trichlorethylene has aided metal fabricators in eliminating a number of troublesome degreasing problems.

In the past, many plants experienced extreme difficulties, resulting in damage to work or to the degreaser unit. Frequently these difficulties could be traced to use of inadequately stabilized solvents.

Columbia-Southern Trichlor, on the other hand, is formulated to provide a stabilizer that assures built-in chemical protection against breakdown under light, heat, oxygen, acids, moisture and repeated distillations.

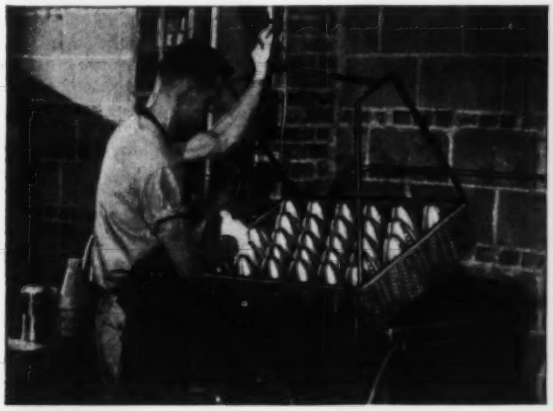
Sludge formation is kept to a minimum as this protection extends itself to the oil soils removed in degreasing.

Degreasing action starts as soon as the part is conveyed into the Trichlor vapor. The vapor condenses on the part immediately. The liquid solvent, now laden with the grease it has removed, drips into a boiling sump.

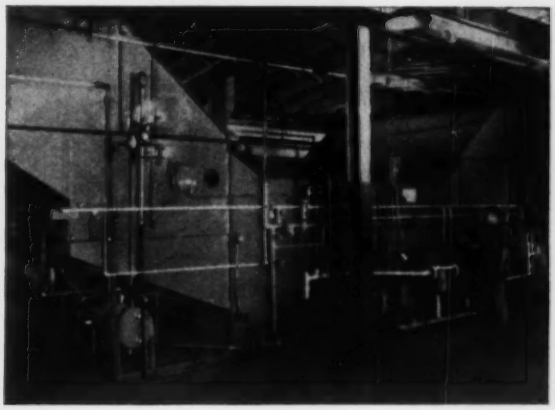


1. A hinge covered with grease, represents a typical metal part, ready for the degreasing process.
2. Vapor action has started—much of the grease has already been dissolved and carried away by the condensed solvent.
3. The process complete—the hinge leaves the vapor degreaser, clean and dry.

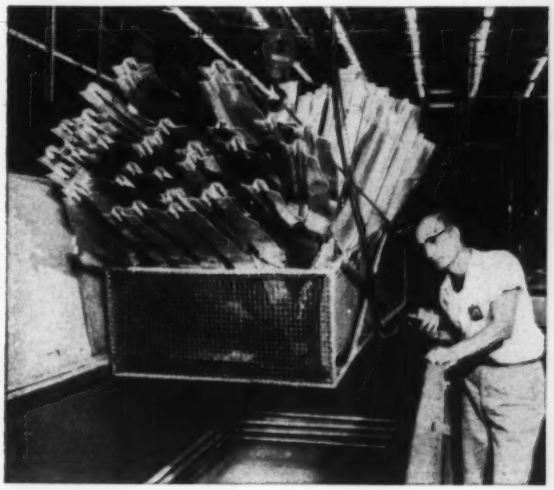
with its modern stabilizer low-cost vapor degreasing



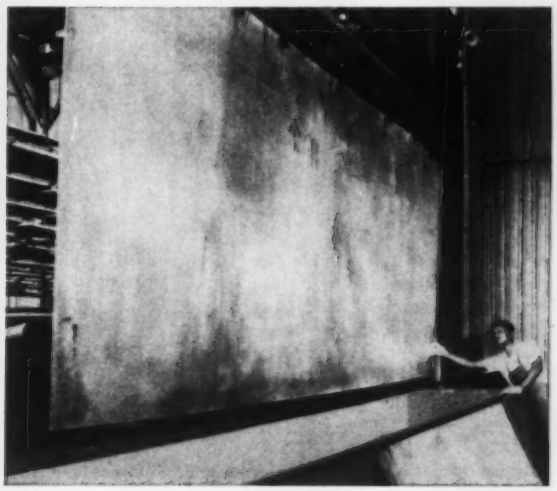
Lamp reflectors are degreased in this manually operated tank type vapor-spray unit. The unit is relatively inexpensive and it occupies very little floor space.



Fully automatic vapor—spray—vapor unit is used by this toy manufacturer for degreasing. Conveyors carry parts through all processing operations.



Vapor degreasing with Columbia-Southern Trichlor offers an extremely flexible and low-cost cleaning method for parts ranging in composition from aluminum to steel, zinc, brass, magnesium, titanium, special alloys.



Aluminum sheet and formed parts are particularly sensitive to improperly stabilized solvent. High-stability Columbia-Southern Trichlor is now specified by many large volume aluminum fabricators for efficient degreasing.

Columbia-Southern Technical Service representatives have earned a top reputation for working with customers in trouble-shooting and in establishing more effective and economical procedures for degreasing. Their services are at your disposal.

Have Columbia-Southern's experts check the efficiency of *your* degreasing operation or help *you* with your solvent specifications. Just contact our Pittsburgh address, or any of the fourteen conveniently located District Sales Offices listed below.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company • One Gateway Center • Pittsburgh 22, Pennsylvania

DISTRICT OFFICES: Cincinnati, Charlotte, Chicago, Cleveland, Boston, New York, St. Louis, Minneapolis, New Orleans, Dallas, Houston, Pittsburgh, Philadelphia, San Francisco IN CANADA: Standard Chemical Limited

Forming

EARLE A. CHANNER
Vice President, H. M. Harper Co.
Morton Grove, Ill.

MELVIN D. VERSON
Vice President, Administration
Verson Allsteel Press Co.
Chicago

C. C. CADITZ
President, Northern Metal
Products Co., Franklin Park, Ill.

J. L. McMARTIN
Director of Engineering
Fenn Mfg. Co., Newington, Conn.

toxicity, lack of ductility, and directional strength must be eliminated.

The steel industry is working out the problems of large, wide, flat, close tolerance sheet alloys that have high strength, high temper, and corrosion resistance. The titanium industry program is slowly raising strength level and reducing the cost.

Refractory metals, ceramics, and cermets are going to find increasing use as heat sinks, leading edges and surfaces, and combustion chamber liners, but it depends on progress in fabrication.

Weight will continue to be an important factor. The current furor over steel and titanium honeycomb is dictated by that problem. As the art improves, joints will become more critical. Large precision extrusions, forgings, pressings, and castings will be developed for lightweight attachments that will require a minimum of machining and joining operations.

Chemical milling is certainly going to increase. Machining speeds must increase. Vibration in a machine tool has to go. Air bearings and other means of reducing friction and conserving power are inevitable. Individual nuclear power drives are certainly a probability.

Numerical controls will be expanded. For airframes, the transition from engineering loft and wind tunnel data to finished parts and components will be accomplished without costly intermediate tools such as loft boards, masters, mockups and fixtures.

High impact energies to form hard materials have distinct advantages. The old bugaboos of warpage and springback can be eliminated. High explosive charges are being regularly used to size, form, swage, bond, and separate materials. The work is bringing about a broader understanding of normal fabricating methods and will be followed by a new generation of equipment and techniques. Certain devices already employ pneumatics and hydraulics which had their origin in explosives.

Supply of Alloy Extrusions Will Increase This Year

—EARLE A. CHANNER

• Five basics will improve the state of the extruding art: Die design, improved die materials, closer and more suitable temperature control, improved lubrication, and billet improvements—both in surface and metallurgy.

We expect that more alloy steel extrusions will be available in the coming year. There will be more difficult configurations and a larger range of alloys.

The market for such products has to be developed more. The economics of the process fit the smaller requirements of shapes currently fabricated from solid bars.

Impact Machining Expected To Receive Wide Notice

—MELVIN D. VERSON

• Pressed metal people are making tremendous progress in impact machining. It applies the principles of cold extrusion to widen the variety of pieces.

It controls the flow of metal in any direction, combining backward, forward, lateral extrusion, and heading into one operation.

Gears, sparkplug shells, tappets, studs, bearing races, engine sleeves, and bearing retainers are being produced.

The primary advantage is economy. You can often use lower cost material—savings of 40 to 70 per cent are not unusual, and machining requirements are almost eliminated.

Expects Cold Extrusion To Become Routine Method

—C. C. CADITZ

• Three developments will have a great effect on metal stampers in 1959. They are:

Cold extrusion will become more of a daily production method; use of clad steels and aluminum will become more commonplace; and "stacked stampings" will find wider application. (Thick, intricately shaped pieces are built up by stacking stampings and brazing or riveting them together. They offer great cost savings in machining.)

Stampers efforts to focus attention on the "make or buy" question will bear fruit. Many end product manufacturers will find operating a stamping operation as a sideline excessively costly and will convert their investment and space into more profitable channels.

Better Auxiliary Equipment Needed To Up Steel Quality

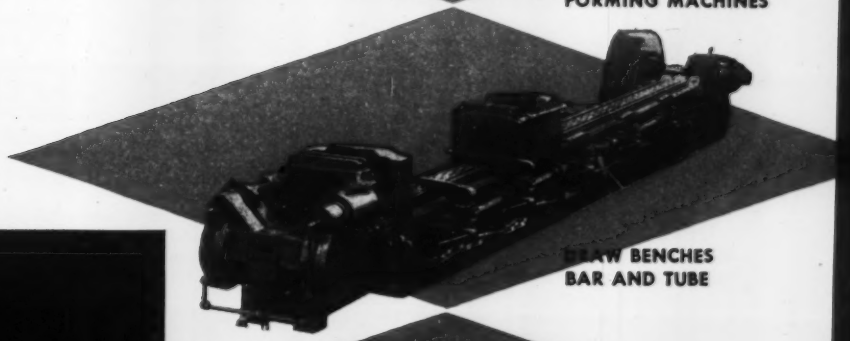
—J. L. McMARTIN

• Look for increased demand for rolled products of higher tensile material, made to closer tolerances and in special shapes, to reduce waste in fabricating.

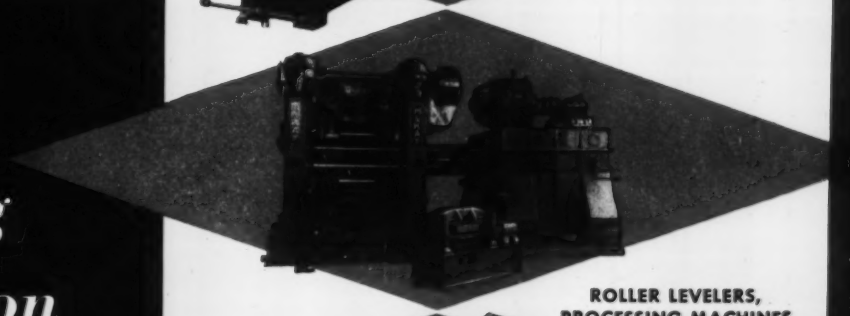
The demand for tougher materials knows no bounds.

Suppliers of standard mill products have to resist increases in quality to meet tonnage requirements. But users need better quality to keep product and tool costs in line. To bring such opposites closer

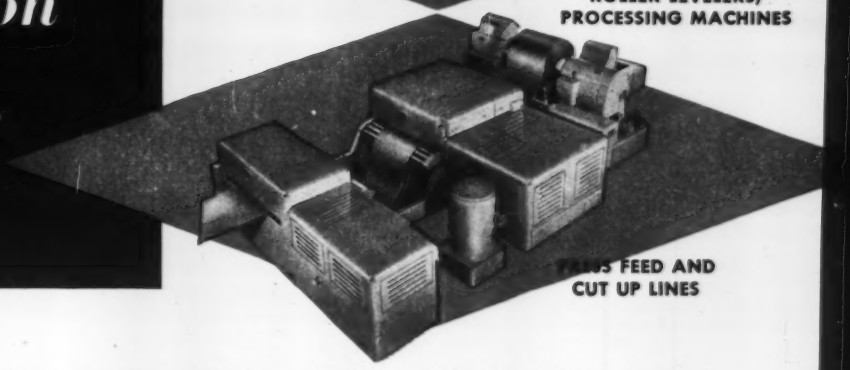
TUBE MILLS AND
FORMING MACHINES



DRAW BENCHES
BAR AND TUBE



ROLLER LEVELERS,
PROCESSING MACHINES



TRUCK FEED AND
CUT UP LINES

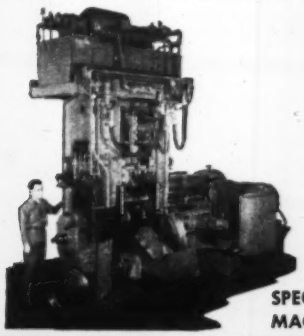
Metal working Automation in action...

If you're in the metal working business, you should be acquainted with McKay *automated* lines available for many metal working operations.

McKay pioneered and has played a leading role in the development of such equipment as that pictured on this page.

Basic McKay designs can be modified, or special machines developed to meet specific requirements.

THE McKAY MACHINE CO., YOUNGSTOWN, OHIO



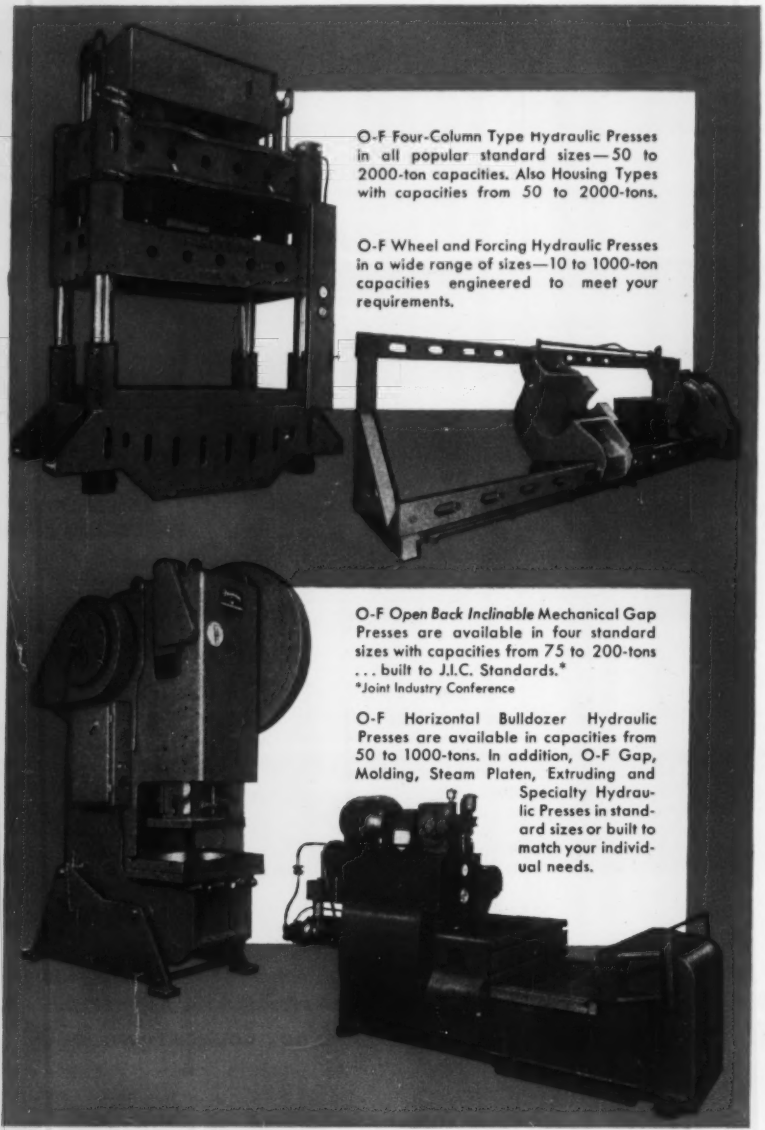
SPECIAL
MACHINERY

McK

Hydraulic and Mechanical

OLIVER *Farquhar* PRESSES

. . . designed and built with individual precision to give you maximum operating efficiency!



O-F Four-Column Type Hydraulic Presses in all popular standard sizes—50 to 2000-ton capacities. Also Housing Types with capacities from 50 to 2000-tons.

O-F Wheel and Forcing Hydraulic Presses in a wide range of sizes—10 to 1000-ton capacities engineered to meet your requirements.

O-F *Open Back Inclinable* Mechanical Gap Presses are available in four standard sizes with capacities from 75 to 200-tons . . . built to J.I.C. Standards.*
*Joint Industry Conference

O-F Horizontal Bulldozer Hydraulic Presses are available in capacities from 50 to 1000-tons. In addition, O-F Gap, Molding, Steam Platen, Extruding and Specialty Hydraulic Presses in standard sizes or built to match your individual needs.

Write, wire or phone today for the facts on Oliver-Farquhar Presses made with individual precision to give you maximum operating efficiency. Our engineers will be glad to submit recommendations covering our complete line of presses.

A. B. FARQUHAR DIVISION
The Oliver Corporation
Press and Special Machinery Departments
York 510, Pennsylvania
Also Manufacturers of Farquhar Conveyors

Forming

A. O. SCHAEFER
President, Pencoyd Steel & Forge Corp., Philadelphia

together, every angle must be exploited that will aid steelmaking quality. That includes improved payoff and take-up reels, automatic gaging, temperature control, automatic screwdowns, and improved handling equipment.

Continual development of shaping and forming by rolling can be expected.

The high material costs will undoubtedly lead to an increase in chipless metal forming.

Of increasing importance will be the specialty mill, engineered, designed, and manufactured for a specific kind of rolling.

It will embody improvements in electrical drive controls.

Ingot Improvement Is Key To Forging Progress

—A. O. SCHAEFER

• Open die forgers are finding more diversified uses for their product.

Demands for forgings, long important to steam and gas turbines, is expected to increase for many years. Forgings will have to meet increasingly severe service. Specifications and inspection techniques will reflect this. It will demand the best of metallurgy and processing.

Forgings predominantly come from electric furnaces. This will be an active field since the ultimate in melting technique is yet to appear.

The forging press has been speeded up and equipped with handling facilities to increase output and reliability.

Modern inspection techniques leave little unknown in a piece of steel. Forg-

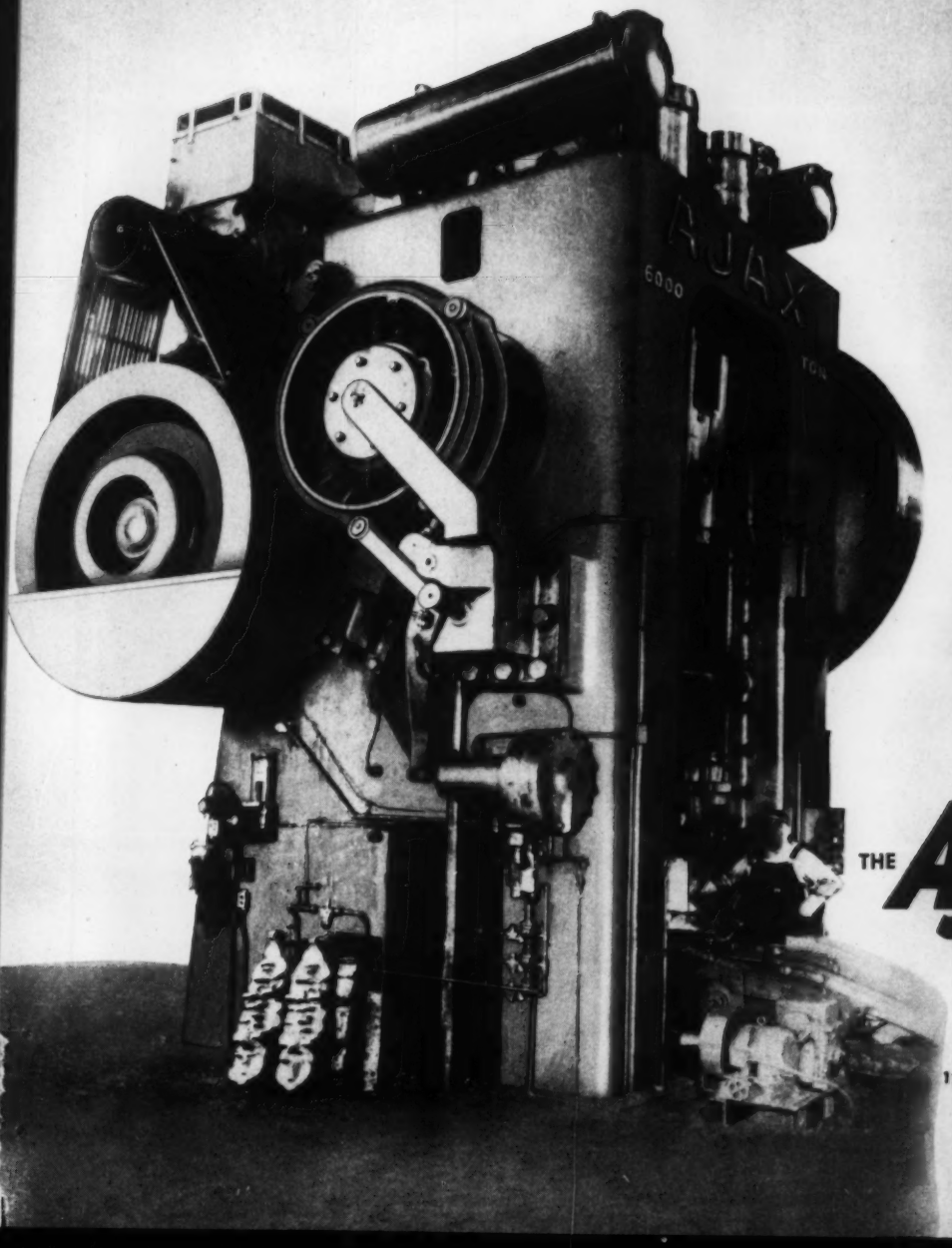
(*Please turn to Page* 350)

High Production of Automobile Crankshaft Forgings on AJAX *High Speed* Forging Presses

Production More than Doubled Over Former Methods on 6000 Ton Ajax Forging Presses

Crankshafts With Less Draft on Counterweights for Lower Machining Costs

For Your Forging Needs . . . Ajax Forging Presses Sizes 300 Ton to 8000 Ton



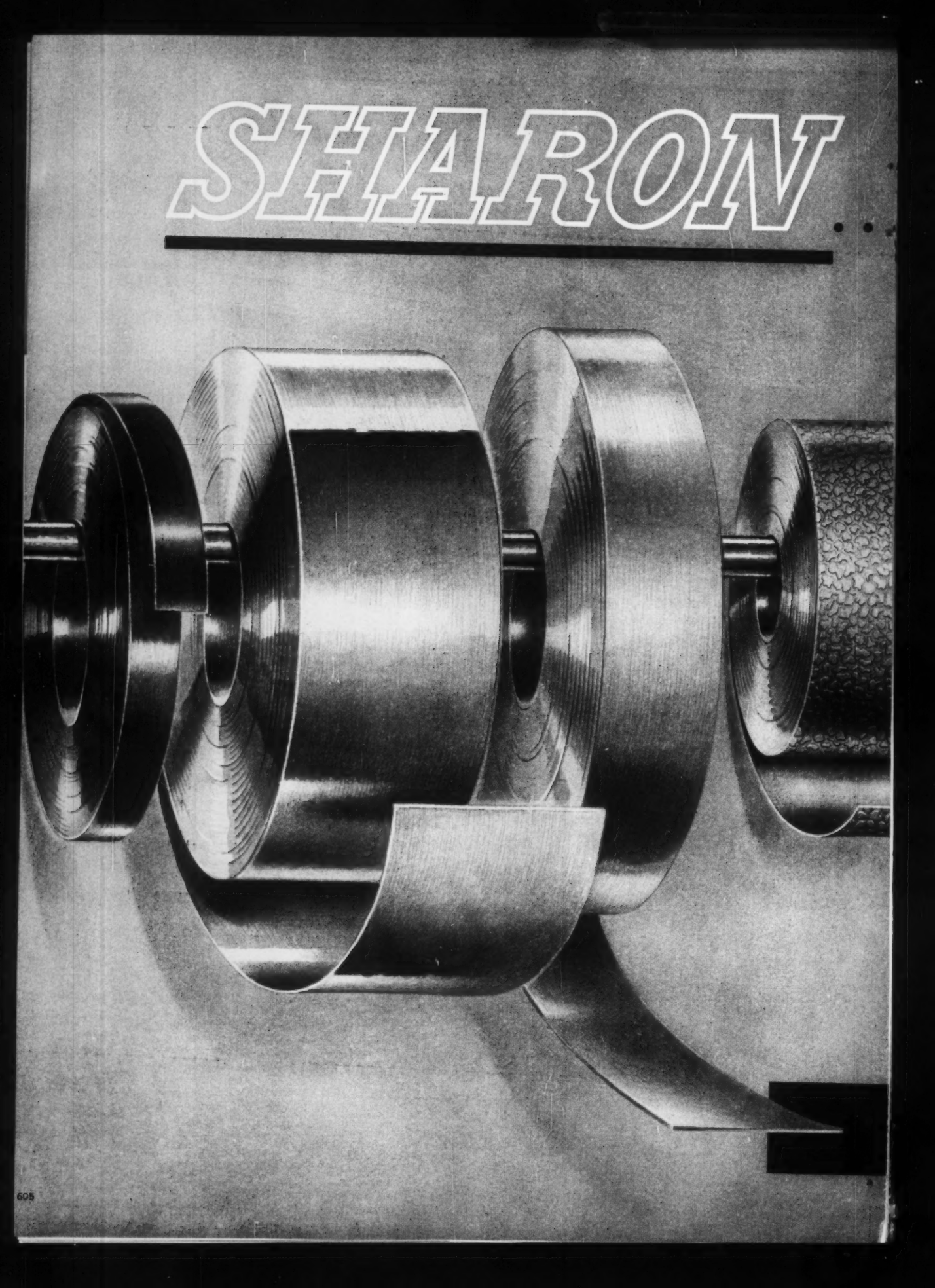
THE **Ajax** MANUFACTURING COMPANY

CLEVELAND 17, OHIO

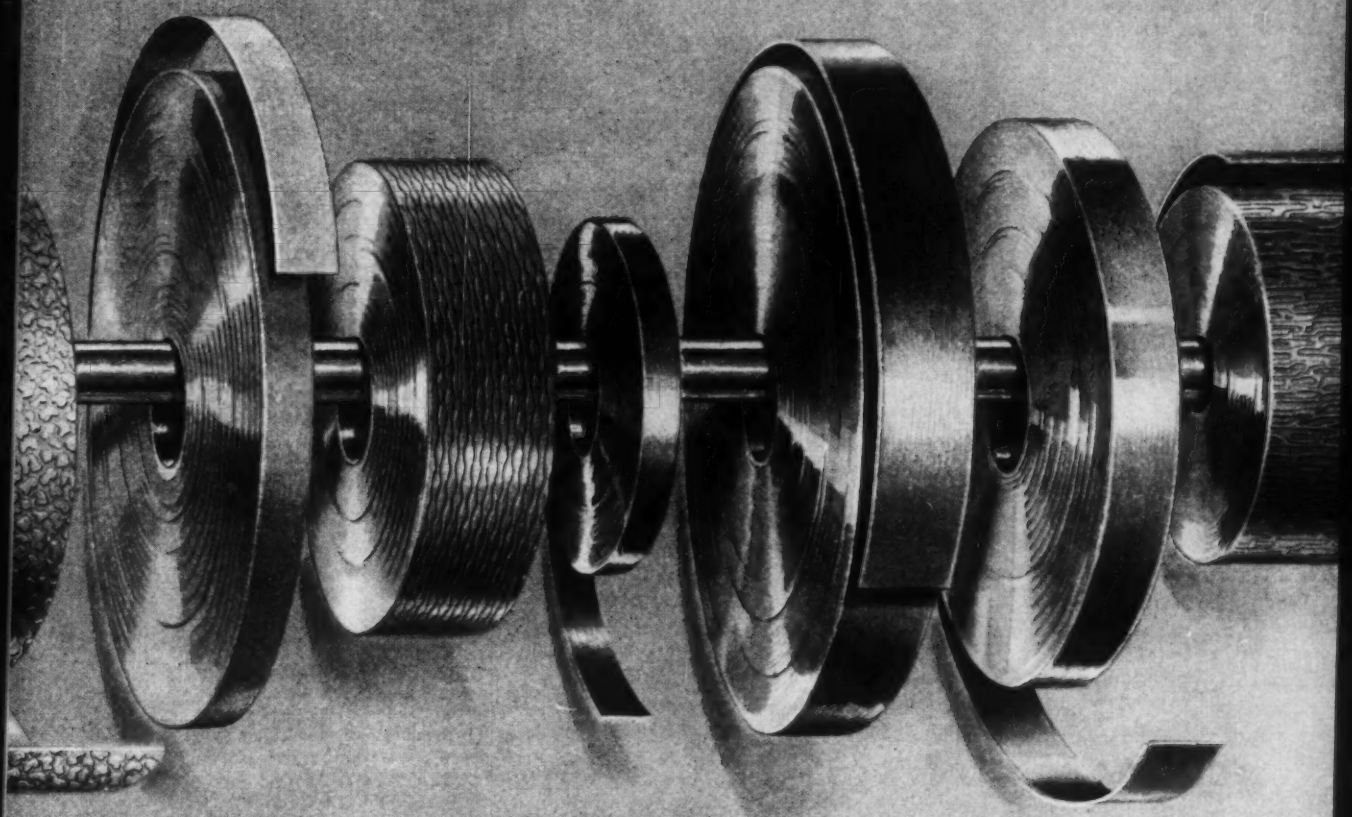
110 S. DEARBORN ST., CHICAGO, ILL.

W. P. WOOLDRIDGE CO.
1209 BURLINGAME AVE., BURLINGAME, CAL.
6440 FLEET ST., LOS ANGELES 22, CAL.

Write for Bulletin 75 C


SHARON

. . a big name in specialty steels



For missiles or mixers, rockets or razors—whatever your steel requirements —depend on Sharon for consistent quality . . . exactly to your specifications.

Sharon makes a complete line of chrome, chrome-nickel, chrome-manganese stainless, spring and high carbon, high tensile, coated, silicon—or any special alloy—open hearth or electric furnace, of any surface pattern, including the new rolled-in designs.

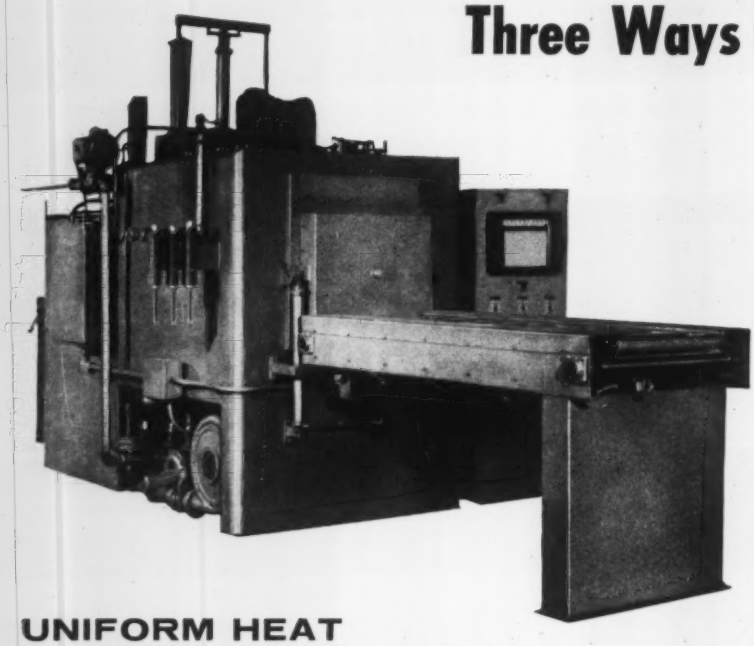
If you haven't already discovered this outstanding source of specialty steels, or the significance of Sharon Quality, make it a point to talk with a Sharon salesman at your first opportunity.

SHARONSTEEL

SHARON STEEL CORP.

SHARON, PENNSYLVANIA

Automatic Heat Treating Unit Improves Uniformity Three Ways



UNIFORM HEAT

Atmosphere and uniform temperature distribution throughout the heating chamber is assured by use of a motor-driven fan. There are no hot spots . . . no stratification.

UNIFORM QUENCH

Submerged jet agitates the oil in the quench tank to give uniform quenching, even in tightly packed loads of small parts.

ACCURATE CONTROL

Heating cycle and quenching cycle can be controlled precisely and automatically by separate timers on the control panel. Either an air or oil quench can be selected by a simple flick of a switch.

The Hevi-Duty atmosphere tempering unit, washer unit and atmosphere generator provide a complete, compact operation for fully automatic clean hardening, carburizing, carbonitriding, carbon restoration and annealing.

Write for bulletins for full details.

- Industrial Furnaces Electric or Fuel
- Dry Type Transformers
- Constant Current Regulators

HEVI DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

Forming

J. E. HAWKING
Sales Manager
Pines Engineering Co. Inc.
Aurora, Ill.

ings in nuclear energy, guided missiles, and rockets, have forced our attention to weldability under adverse conditions and high temperature resistance.

There is increasing awareness that the root of our progress may be in the forging ingot.

Future improvements will develop from better steel ingots.

Range of Tubing Applications Broadened by Bending Press

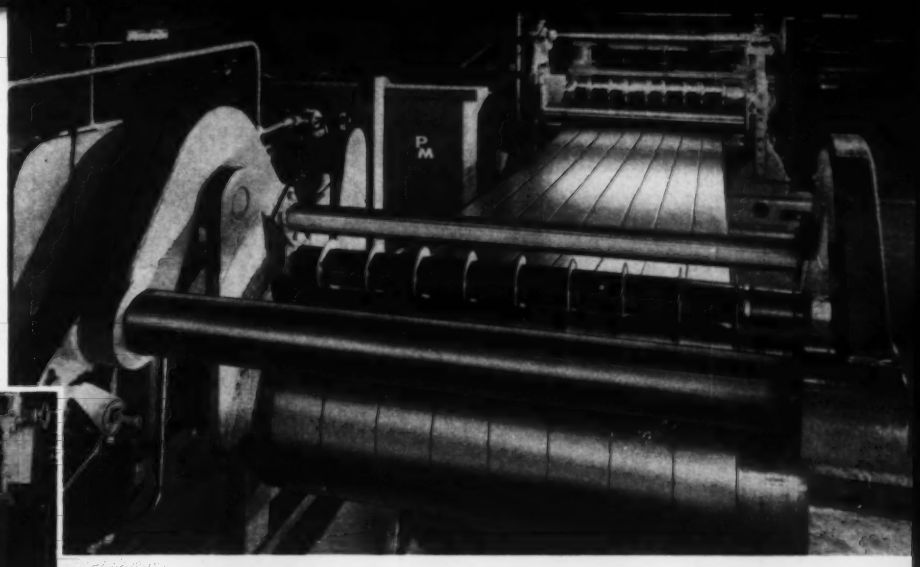
—J. E. HAWKING

• Bending machines for tubing have a new blood relative: Tube bending presses. Unusual new refinements will be the big-best contribution in 1959. They double and sometimes triple today's production figures.

Small hydraulic presses with variable stroke, automatic index, and adjustable pressure cushions on wing dies, bend tubing progressively without mandrels. Ninety degree bends with section deformation comparable to mandrel bends have been made in 1¼ in. tubing on a 2¾ in. center line radius. It will produce 2500 bends an hour. Many other sizes are in production. Where production warrants, automatic feeds will multiply cost savings still more.

Rotary bending machines will be automated for a few applications. Tube and sections up to 10 in. will become common.

Aircraft benders will have controls reducing setup time. Design trends in aircraft and missiles will necessitate techniques developed for the heavy power



PM slitting lines are designed for efficiency. This complete, highly automated PM line in a warehouse handles a variety of metals — steel, stainless steel, aluminum, etc. The picture shows one of the time saving features of the line, a PM overhung arm separation device, used instead of heavy, individual large diameter discs.

PM uncoiler with a peeler that feeds into the flattener without manual handling — this device provides a safer, faster operation on this line, which handles gages up to 3/16", widths to 48", and coils as heavy as 30,000 lbs.

PM automatic edge control guides, .004 strip to slitter without edge damage on this light gage stainless line.

Automation in upending, banding, and downlaying coil saves time and dollars.

To get the kind of Slitting Line YOU need, use P/M PRODUCTIONEERING*

PM lines are built to fit the user's needs. To survey your needs, and determine the best answer for your requirements, make use of the first step in *PM Productioneering**, a talk with the PM man.

You will learn from him that PM Productioneered lines include heavy duty equipment (to handle up to ¼" gage steel); lines designed for lighter gages down to .002"; lines that handle a variety of metals including steel, stainless, aluminum, brass, copper; lines for a full range of coil weights up to largest handling by mills . . . Some are highly automated. Some are specially designed to fit difficult layout situations in crowded plants. Component parts of these lines are standard, but the flexibility of Productioneering tailors each line to the specific situation.

Flexibility in meeting individual needs makes PM lines differ, but PM Productioneering puts one common denominator into all PM products—maximum profits for the owner. Get in touch with a PM man today — there's no obligation.

Production Machinery Corporation
Mentor, Ohio

***PRODUCTIONEERING** is the P/M way of working so engineers who supervise equipment designing have first-hand knowledge of problems encountered by sheet and strip processing line users. In working with P/M you work with responsible engineers who apply their skill to solve your problems.

P/M PROCESSING EQUIPMENT INCLUDES:

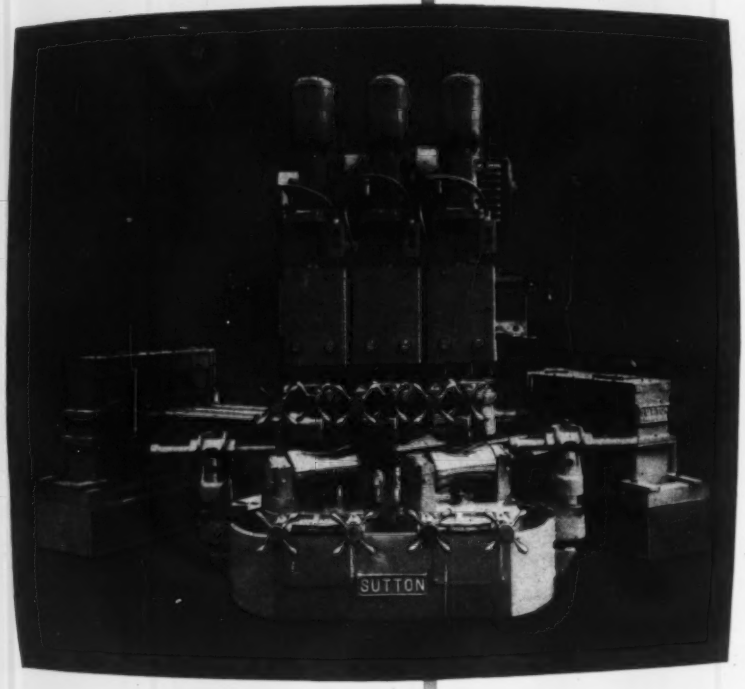
Pickling Lines
Slit Coil Banding Equipment
Shearing and Cut-to-Length Lines
Grinding and Scouring Lines
Coil Build-up and Inspection Lines
Vacuum Handling Equipment
Continuous Lines for Annealing, Coating, Grit Blast Cleaning, Leveling and Miscellaneous Sheet and Strip Processing.

P/M

SUTTON STRAIGHTENERS

with *Syncro-Drive*

for bars and tubes of all metals



A complete new series of

5-ROLL, ROTARY STRAIGHTENERS

For Superior Straightening at High Production Speeds

Patented Sutton Syncro-Drive provides entirely guideless, precision straightening for the finest quality end-to-end straightness of bar and tube stock.

With Syncro-Drive, users can straighten materials previously found difficult, or even impossible to straighten, such as thin-walled tubes and bars of stainless steel, brass, zirconium, titanium and other modern metals.

Ask for complete data

Model 15SD
(PICTURED)

For Bars
from 5/16" to 2" Dia.

For Tubes
from 5/16" to 3" O.D.

8 MACHINE SIZES AVAILABLE FOR BARS AND TUBES OF ALL SIZES

SUTTON *Engineering Company*

FIRST NATIONAL BANK BLDG., PITTSBURGH 22, PA.

PHONE: GRANT 1-8077 • PLANT: BELLEFONTE, PA.

Manufacturers of Straighteners, Hydraulic Extrusion Presses, Centerless Bar Turners, Rotary Swagers, Sheet Levellers and other Processing Machines for Modern Metals.

Forming

J. K. WINGARD
Manager, Press Engineering
E. W. Bliss Co., Canton, Ohio

boiler industry. We are able to bend heavy wall tubes to radiuses of one diameter with no appreciable wall thinning.

Conversion from metal removal to metal forming is no longer a trend: It is practice.

Bending machine operations are being used hand-in-glove with other new forming techniques by product designers in an effort to keep costs in line.

Presses To Be More Versatile, Have More Auxiliaries

—J. K. WINGARD

• We believe that cold extrusion and warm heading of ferrous and nonferrous materials will progress. The material savings and cost reduction make cold forming attractive to many.

Explosive forming is relatively new, and you can look for progress in this unusual method.

The emphasis in standard metal forming fields will be on improved designs which feature appearance and safety with improved speeds and handling. Standard presses will be made more versatile through auxiliary equipment.

Powdered metals will find added uses. Copper and pure nickel can be continuously rolled into strip.

We expect higher speeds to be available; we have some presses running at 1000 strokes per minute.

Technological problems yet to be overcome are in electronic controls for fast, precise actions, and measurements. Heat exchange improvement and lubrication advances also are on the way.

Here at The House of Stainless, we provide a metallurgical service that goes far beyond helping you select the type of stainless best suited to your application.

We can help you determine how best to work with the stainless selected. How best to handle such operations as machining, welding, soldering, drawing, forming, spinning, or the many other facets of fabrication.

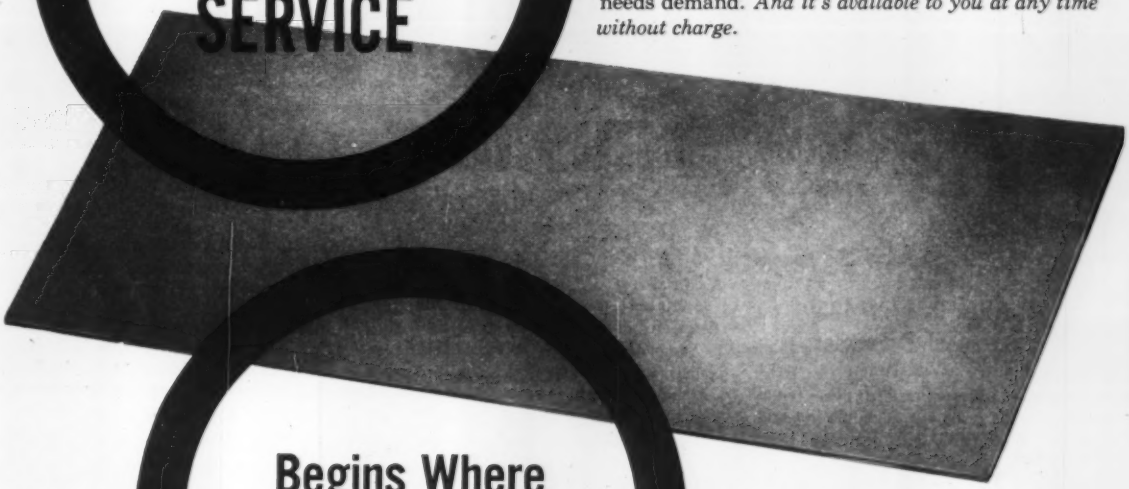
This help can include assistance in adapting your present equipment for handling stainless steel as well as counsel on set-up and operating procedures.

It can mean help in tool design for long life and economical production—plus assuring finished parts to meet your quality standards.

Important, too, is the know-how and experience available to you in exploring possible avenues for maximum economies both in fabrication and finished product.

In short, Metallurgical Service at The House of Stainless can be as broad and inclusive as your needs demand. *And it's available to you at any time without charge.*

This METALLURGICAL SERVICE



Begins Where You'd Expect It To End!

The House of Stainless
STEEL AT YOUR SERVICE JILLL

With our complete warehouse stocks, we can make prompt deliveries for normal requirements. Where mill shipments are called for, we are in constant touch with the leading stainless-producing mills to fill your requirements at no extra cost to you.

Just phone LAfayette 3-7210

CHICAGO STEEL SERVICE COMPANY

Kildare Avenue at 45th Street, Chicago 32, Illinois · Mailing Address: P.O. Box 6308, Chicago 80, Illinois

Milwaukee District Office: 757 N. Broadway, Milwaukee 2, Wisc. Telephone: BRoadway 3-7874
Sales Representatives at Bloomington and Rockford, Illinois • Indianapolis and South Bend, Indiana
Davenport, Iowa • Grand Rapids, Michigan • Minneapolis, Minnesota • Appleton, Wisconsin
YOUR DEPENDABLE SOURCE FOR BOTH CARBON AND STAINLESS STEEL

WALTER R. MEYER
President
Enthone Inc.
New Haven, Conn.

H. F. OSTERMAN
Sales Manager
Branson Ultrasonic Corp.
Stamford, Conn.

C. C. MARCH
Vice President, Coated Abrasives & Related Products Div., Minnesota Mining & Mfg. Co., St. Paul

GORDON RICE
Equipment Engineer
Turco Products Inc.
Los Angeles

1959 FORUM ON TECHNICAL PROGRESS

Cleaning and Finishing

Improvements Due in 1959 Cover Variety of Processes

—WALTER R. MEYER

• Significant improvements in metal cleaning, scale removal, electroplating and chemical treatments will occur in 1959.

Metal cleaning will be improved by the availability of new additives for chlorinated solvents to remove buffing compounds, new aqueous buffing compound removers, new chelate containing alkali cleaners for simultaneous cleaning and rust removing to eliminate acid dips and to shorten plating cycles.

New nonfoaming surfactants will permit the formulation of better spray cleaners.

Ultrasonics will find wider usage for solving difficult cleaning and oxide removal problems.

Powered acid salts containing fluorides and detergent materials will offer the user more efficient and less hazardous products for oxide and scale removal.

Electroplating improvements will include more ductile bright nickel plating, the use of multiple nickel coatings, much wider use of thicker crack-free bright chromium, chromium plating directly on aluminum.

Sintered metal parts as well as porous castings will be finished more effectively by wider use of "Peen" plating and antitarnish agents. Interest in finishing and plating on magnesium alloys is increasing and a new process for chemical reduction (electroless) plating of nickel has been offered to the market.

Some of the needs of the finishing industry include methods for the production of more uniform and durable colors on aluminum, methods for preventing refractory metals from oxidation at elevated temperatures including titanium, molybdenum, and columbium, noncyanide plating baths to ease waste disposal, water-rinsable materials for hot flowing of tin, bright tin plating solutions, methods for selectively precipitating impurity metals from plating solutions and methods for reducing or eliminating tarnishing of bare silver, copper, and brass. Work is being done on all of these problems and partial solutions will be offered.

Broader Potential Seen as Ultrasonic Units Progress

—H. F. OSTERMAN

• Today, transducer areas are measured in square feet, instead of square inches. Due to the steady reduction of costs, coupled with marked improvements in equipment performance, more and more processes are becoming technically and economically feasible.

To be sure, the cleaning of precision parts will remain one of the foremost uses for sonic energy. However, increased use for more diverse purposes and in large installations is imminent. In many cases it's a fact. In the nuclear field for instance, reactor components are being cleaned, and effort is being directed toward removing scale and pickling residue from high alloy tubing.

One of the most vexing problems is the erosion of the sound radiating surfaces caused by the mechanism which is responsible for cleaning: Cavitation. Solutions for this and other problems are on the horizon and should begin to make themselves felt during 1959.

Present trends in ultrasonic equipment of increasing quality and utility together with decreasing costs will continue. These factors will tend to expand the field of application to the point where ultrasonic processing will be commonplace in the primary metal industry.

Coated Abrasives May Trigger Grinding, Finishing Revolution

—C. C. MARCH

• A revolutionary new product for metal preparation is being evaluated in the primary metal industries and has created a whole new range of architectural finish possibilities. In addition, it shows promise of reducing pickling time and the chemical consumption and metal loss inherent in pickling.

It is but one of new avenues we

WILLIAM P. INNES
Technical Director
MacDermid Inc.
Waterbury, Conn.

T. J. KEARNEY
Asst. Mgr., Industrial Equipment Div.
Detrex Chemical Industries Inc.
Detroit

E. J. KUBIS
Manager, Metal Finishing Sales
Wyandotte Chemicals Corp.
Wyandotte, Mich.

H. L. BENNER
Electroplating Service Manager, Sodium
Prod. Div., E. I. du Pont de Nemours
& Co., Wilmington, Del.

will continue to explore in 1959 to answer problems presented by new requirements for finishes and materials in the mushrooming aircraft and missile industry. Each new high-temperature alloy poses a potential grinding problem. Each new step into space offers a new problem in finish.

During 1958 there were many improvements in product lines; many standard coated abrasive products were upgraded or revised to meet new, more stringent industrial requirements. The result is that the consumer is getting more for his coated abrasive dollar than ever before.

Indications are that what's on tap for the sixties will possibly revolutionize present grinding and finishing methods. Certainly, it will broaden them far beyond present capabilities.

Low Temperature Phosphating Shows Big Potential

—GORDON RICE

• We predict that low temperature phosphating will be in almost universal use within the next five years.

Phosphate processes, which are applied by immersion or through an industrial spray washing machine, have until recently required temperatures in the 180° F range. Low temperature phosphating is done at 80 to 100° F. The coating is as good as those obtained with higher temperatures.

Savings in heating costs are immediately apparent. Imagine the fuel that might be required to maintain a 180° F temperature throughout an 11 stage spray washer, with the tremendous heat loss involved in a constant spraying operation. Also think of the drastic savings that can be effected when the washer can be operated efficiently at a temperature 80 to 100° F lower.

Not only is a tremendous fuel saving effected, but original equipment costs are lower, since the need for heating facilities is minimized.

Low temperature phosphating also minimizes maintenance costs. There is far less sludging. What little sludge is formed is soft, light, and nonadherent; it can be quickly and easily removed.

Advances in Finishing Solve Special Problems

—WILLIAM P. INNES

• Industry and professional societies have been studying the corrosion mechanism of copper and nickel and chromium coatings on steel and zinc base diecastings. It has been proved that the durability of these coatings on both steel and zinc base diecastings can be greatly improved by increasing the thickness of chromium and using a crackfree deposit.

There has been an increase in electropolishing of metals to produce a bright finish and remove burrs. The process produces a more corrosion resistant finish because of an improvement in surface finish.

Chemical processes are improved for smoothing, brightening, deburring, and producing highly resistant chemical films on aluminum, zinc base diecastings, zinc and cadmium plated steel, steel, copper, brass, and silver. Most of the chemical films can be dyed. The solutions can also be used to remove burrs.

Cleaning and Painting Now Done in One Unit

—T. J. KEARNEY

• The development of a system for cleaning and painting of parts within one integrated unit is expected to receive wide acceptance in metal finishing. In most cases, this new process requires no more floor space than that required for solvent degreasing. Savings in floor space, thinners, and operating costs will result. Overall savings of 20 to 50 per cent of the finishing costs are anticipated. Paint dip or flow coating can both be combined in a continuous process.

Paint and Buffing Compound Removers Will Be Improved

—E. S. KUBIS

• In 1959, plated finishes will be more corrosion resistant, paints will be tougher and more resistant to weather, and improved porcelain enameled finishes will be applied to aluminum in growing volume.

New, relatively inexpensive paint removers will be capable of quickly handling new epoxy and methacrylate finishes. The new paint finishes are resistant to the usual caustic soda type removers commonly used for economical paint removal.

The removal of buffing compound, a problem which has plagued industry for years, will show substantial progress.

There has been more progress in cleaners and allied metal finishing chemical specialties in the last five years than in the preceding 15 but the need for further progress becomes quickly evident as new production processes and finishes for metals are evolved. Right now, for example, a rapidly growing aluminum finishing industry needs better chemical brightening baths and better methods of plating on aluminum.

New Preplate Bath Levels Chromium Surface

—H. L. BENNER

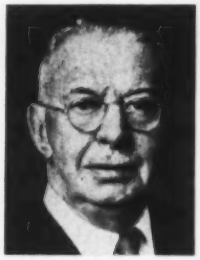
• A new cyanide copper bath with marked ability to plate "leveled" deposits is expected to find wide usage on parts to be chromium-plated. Superior corrosion resistance is indicated because of the laminar structure of the copper in con-

Cleaning and Finishing

MYRON B. DIGGIN
Vice President & Technical Director
Hanson-Van Winkle-Munning Co.
Matawan, N. J.

E. S. GARVERICH
Mgr., Technical Service Dept.
Pennsalt Chemicals Corp.
Philadelphia

ROBERT G. HALL
Special Engineer
Pangborn Corp.
Hagerstown, Md.



A. E. CARPENTER
Chairman
E. F. Houghton & Co.
Philadelphia

trast with the usual columnar-type deposit. The ability of the leveled bath to fill minor polishing imperfections in the basis metal is undoubtedly a contributing factor in its protective value.

A new double salt of sodium and copper cyanides has found good acceptance in the industry. A white salt made by drying a filtered solution of sodium cyanide and copper cyanide, it is readily soluble and offers definite advantages—high purity, simplified control, and convenience.

Competition Spurs Progress In Electroplate Finishes

—MYRON B. DIGGIN

• There is no question that anodized aluminum and stainless steel will continue to be used for auto trim in areas where their suitability has been demonstrated. Several limitations in producing bright anodized trim parts have been given considerable study recently. It is predicted that at least some of the problems will be solved and improved methods utilized commercially this year.

As usual, competition from other materials has stimulated those concerned with electroplated finishes to redouble their efforts to improve the durability of these coatings. The development of more informative accelerated corrosion test methods has given the industry a better yardstick for measuring the performance of these coatings.

Many producers of electroplated parts have already adopted improved plating methods, such as duplex nickel coatings under the chromium top coat, and they have recently found modifications in the conditions for chromium plating that produce a remarkable increase in the protective qualities of the nickel-chromium or copper-nickel chromium system. During 1959, these procedures will be written into many specifications. The resulting improvement in the durability of these bright coatings will unquestionably benefit the industry as well as the consuming public.

Metal Cleaners Marketed In New Package Sizes

—E. S. GARVERICH

• One of the things to watch in '59 is improvement in handling and packaging methods. For years, cleaning compounds and other specialty products used in metal finishing have been supplied in relatively standard 40 to 50 gallon containers. Now, the rising cost of packaging and handling has made bulk shipments of etchants, strippers, and similar items attractive to the large user.

Look also for the other extreme: New ideas in small packages of "addition-unit" sizes for the automation-minded customer.

Problem of the year: How can the various engineering groups maintain contact in the face of ever-increasing specialization? For example, when a press shop lube is selected, the finishing engineer should have an opportunity to observe its effect on finishing, a procedure endorsed but seldom followed in industry.

Possible solutions: 1. Rotation of engineers. 2. Project planning. 3. Greater reliance on "full line" suppliers.

Blast Descaling Methods Show Cost Advantage

—ROBERT G. HALL

• Descaling by steel shot or grit blasting has brought about a new era of production and greatly lowered costs to all producers of sheet and structural sheet parts. The process is clean and dry. In addition, it requires a minimum of space and investment, compared with other cleaning methods. It is adaptable to full automation when desired.

One of the areas for substantial potential growth of blast descaling is in low carbon steel hot strip cleaning lines, in preparation for cold rolling. Stainless steel producers are accepting this process. With a blast descaling cabinet in a hot strip cleaning line, two major economies show up at once: 1. Required acid immersion is cut yet tonnage is maintained. 2. Existing acid cleaning capacity can be maintained with greatly increased tonnage.

Continued research in product improvement has increased the life and efficiency of blast cleaning equipment. A new vacuum cast steel shot with a controllable quality feature of "continuous heat treating" is on the market and earning a splendid service record.

Water-Soluble Oils Aid in Metal Surface Treatment

—A. E. CARPENTER

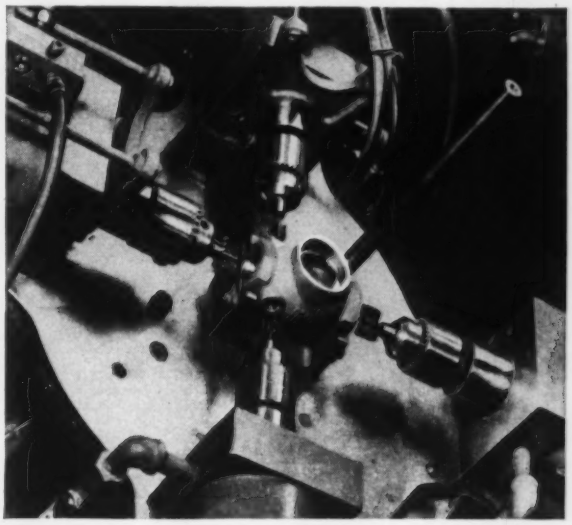
• The desire to make a processing oil more readily removable has resulted in the use of water-soluble products where feasible. This has been done for years with cutting fluids, perhaps more for economy than for removability. Drawing compounds also are often emulsifiable to a degree, facilitating the cleaning. Now we see a similar tendency in quenching. Our German affiliate has marketed a water-soluble quenching oil, with this thought of easy removability in mind.

The cleaning of soil from metal surfaces often results in a clean surface subject to immediate rusting. A small amount of water-soluble rust preventive added to the last rinse will often serve to protect the parts from rust without adding an

How to speed production with power brushing

Here's a sure way to speed production ... cut costs ... improve product quality —*Osborn Power Brushing.* Let us show you how to clean, finish and deburr metallic or non-metallic parts, large or small with efficient, low-cost power brushing today.

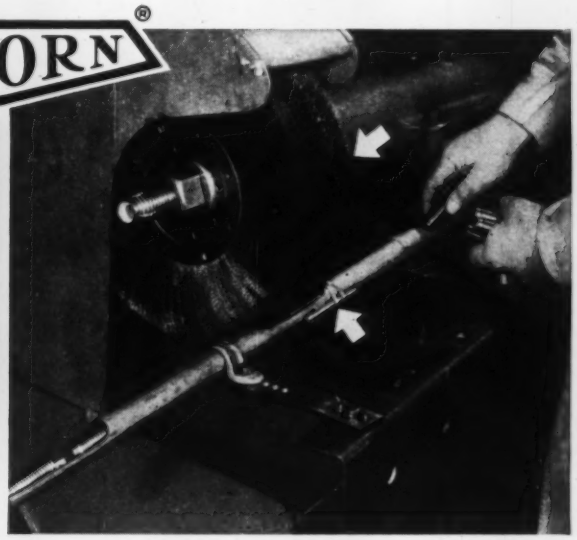
The uses for power brushes in industry for metal finishing are virtually unlimited. An **O**sborn **B**rushing **A**nalyst can show you how to benefit. Write *The Osborn Manufacturing Company, Dept. S-2, Cleveland 14, Ohio.*



SPEED BURR REMOVAL—The 4 threaded ports in this valve body are being deburred and cleaned in one fast operation by Osborn Situft® Brushes and this simple power brushing setup. Doing the job by hand was slow, costly. Now Osborn Power Brushing does it 66% faster ... saves 8 manhours per thousand parts.

OSBORN®

SPEED FINISHING—These aluminum ammunition components are finished at high production rates ... to meet rigid quality control standards. Here, three Osborn Master® Wheels plus simple rotating fixture setup finish pieces at a rate of 1400 per hour. Feather burrs are thoroughly removed ... surface junctures are blended uniformly to cut the cost on this job 74%.



SPEED CLEANING—For cleaning set-screw threads, this manufacturer relies on Osborn Power Brushing. Operator feeds screws into a simple pipe-fixture ... Osborn Monitor® Brushes spin and clean them fast, thoroughly. A stationary Osborn Situft® Brush controls rotation and traverse of the screws across brush faces. Cleaning time is cut from 18 to 2 seconds per piece.

Write TODAY for Osborn Catalog 210-C.

Osborn Brushes

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • BRUSHING MACHINES • FOUNDRY PRODUCTION MACHINERY

Cleaning and Finishing

D. S. GAARDER
Gen. Mgr., Industrial Sales Div.
Sherwin-Williams Co.
Cleveland

STUART J. SWENSSON
Secretary-Treasurer
American Hot Dip Galvanizers
Association Inc., Pittsburgh

HUGH D. McLEESE
Vice President
Metal & Thermit Corp.
New York

M. B. ROOSA
Executive Vice President
Parker Rust Proof Co.
Detroit

oily film that would require removal. Where an extremely light coating is desired, a variety of oil-and-water-soluble rust preventive can be diluted with a small amount of mineral seal oil.

Rust removal has also received new attention. Experimentally, liquid cleaners have been developed for alkaline derusting. Research progress has been made on etching of aluminum to give it a satin finish, by subjecting it to alkaline treatment.

Resin and Pigment Advances Portend Market Growth

—D. S. GAARDER

• Advances are rapidly shaping up in both resins and pigments.

In resins, immediate advances will probably stem not so much from new discoveries as from greater knowledge of how to combine resins more effectively. The trend is definitely toward paint films that will dry faster and combine superior hardness, improved flexibility, and greater resistance to wear, abrasion, chemicals, and exposure.

Improved pigments, greatly extending current color conceptions, are also in the offing. Cleaner, clearer colors will become increasingly available. These new colors will be much more permanent than many heretofore offered.

Many of the finishes growing out of the technological advances represented in resin and pigment improvement adapt themselves readily to emulsion formulation. Such emulsions are already in some water-reducible enamels and insulating varnishes.

One promising way to meet speed requirements is with the rapidly developing technique of strip coating. Precoating of metals for subsequent forming is no longer experimental. It is being used in a wide range of fabricating operations. Introduction of faster finishing methods, in turn, will require increased attention to metal preparation techniques.

Galvanizers Set To Stress Low Maintenance Costs

—STUART J. SWENSSON

• One of the most significant innovations is the galvanizing of structural steelwork for bridges. Because of the difficult maintenance problem involved, the durability of hot dip galvanizing is used to best advantage. This application is still in its infancy, but it appears to have a big future.

To meet the growing need for hot dip galvanizing, particularly in the realm of larger construction, the trend is toward larger baths and higher productive capacity, coupled with the full utilization of modern galvanizing techniques to insure the highest product quality.

Work is already underway to solve the problem of wet storage strain (it may afflict galvanized steel that is stored or transported under damp, badly ventilated conditions) and to further improve the performance of galvanized hot water storage tanks.

It is the industry's conviction that hot dip galvanizing provides the best low maintenance rust protection for steel. You will see galvanizers press that claim to the limit this year.

Heavier Chromium Plate Tackles Corrosion Problem

—HUGH D. McLEESE

• One of the most recent significant developments in electroplating is the increasing awareness that greater thickness of chromium can provide improvement in corrosion resistance far in excess of the relative increase in total plate thickness.

For nearly 30 years, chromium deposits of about 10 to 20 millionths of an inch have been standard. Greater thicknesses were not used because of excessive cracking. While chromium itself does not corrode, it cannot, when 10 to 20 millionths thick, seal out corrosive materials that may attack the base metal. So ways of increasing the thickness of chrome plate and, at the same time, making it free of cracks, have been sought for some years.

Successful methods of producing heavier, crackfree deposits for industrial applications were introduced some five years ago. It is only within the last year or so, however, that bright, crackfree chromium in thicknesses of 30 to 100 millionths have become commercially feasible for decorative use.

While such deposits may be produced with ordinary chromium plating baths, self-regulating baths are preferred because they have greater throwing power and are easier to control. In either case, they provide an impervious layer of chromium which prevents corrosive materials from reaching underlying coats of nickel and copper or the base metal.

Demand for Finished Aluminum Spurs Process Development

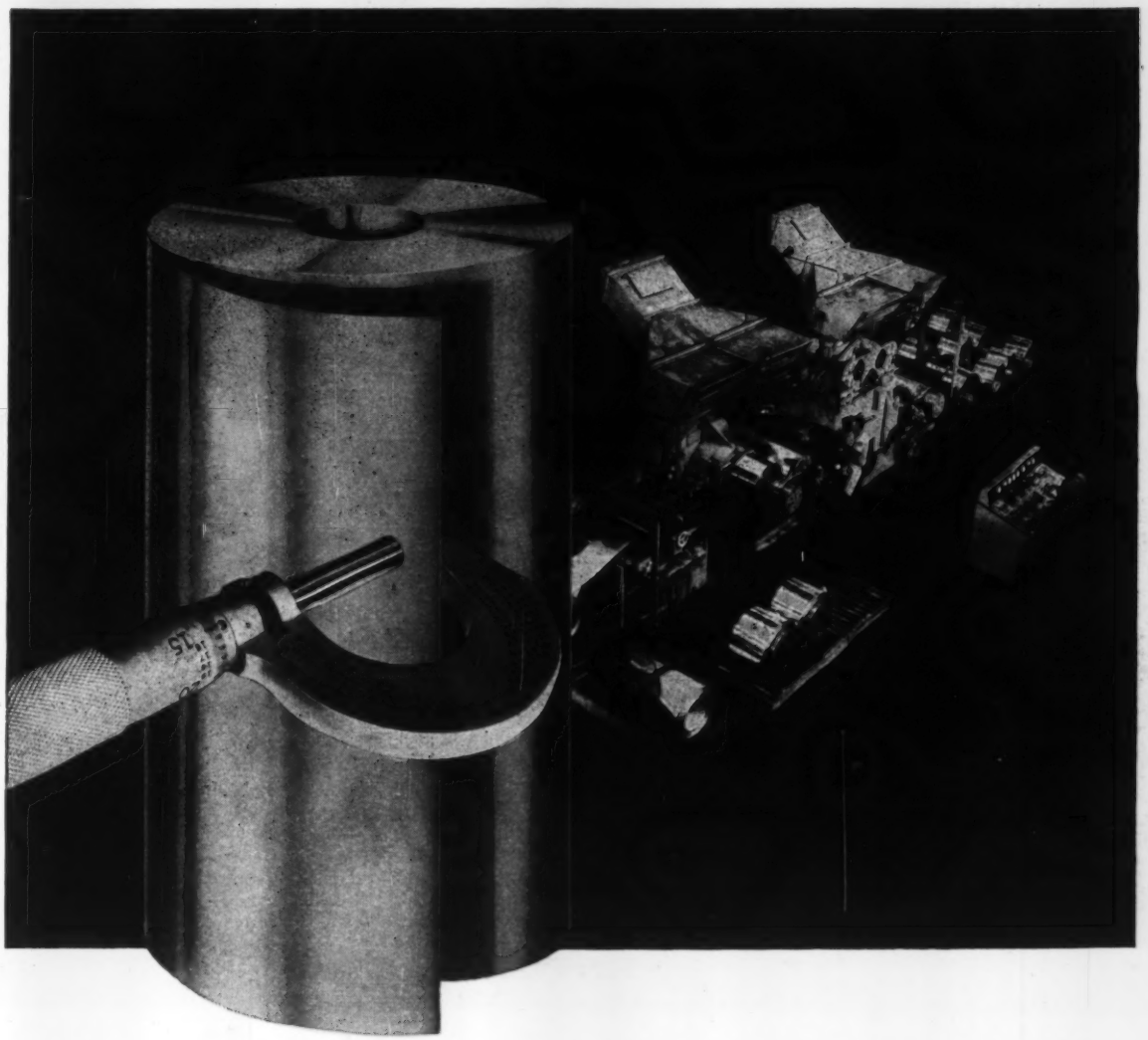
—M. B. ROOSA

• The rapidly increasing use of painted aluminum foretells new and greater demands for chemical coating materials. Newly developed processes for treating aluminum prior to painting offer increased efficiency. The coatings produced on the aluminum are either of the chromate chromic-oxide type or the chromium phosphate type.

Until recently, it was necessary to discard treating baths after relatively short

When Brass Strip Tolerances Call For

PERFECTION TO THE "Nth" DEGREE



Possibly, you've never seen—or even heard of—a Sendzimir Rolling Mill like the one pictured above. Not many people have. But if you use close-tolerance brass, copper or bronze strip, you'll certainly appreciate what these high-speed, precision units can do when you order Bridgeport Sendzimir-Rolled Strip.

These mills—now in operation at Bridgeport's plants—are capable of rolling light-gauge strip into economical, long-length coils to meet the most rigid gauge tolerances.

Bridgeport Sendzimir-Rolled Strip has other advantages as well. It has remarkable uniformity of gauge and mechanical properties from edge to edge and end to end. It also has a beautiful luster—all properties you can use to advantage in your own production.

Get details on Bridgeport Sendzimir-Rolled Strip today. Call our nearest Sales Office or write Dept. 3901.

matched
Bridgeport **Brass Alloys**
to your job

BRIDGEPORT BRASS

Offices in Principal Cities • Conveniently Located Warehouses
Bridgeport Brass Company, Bridgeport 2, Connecticut

Cleaning and Finishing

JOHN V. DAVIS
Chief Engineer
Udylite Corp.
Detroit

J. J. HARGARTEN
Service Manager, Chlorine Prod. Div.
E. I. du Pont de Nemours & Co.
Wilmington, Del.

H. C. IRVIN
President
Allied Research Products Inc.
Baltimore

use due to the rapid buildup of impurities. The new conversion coating baths utilize ion exchange through which a portion of the bath is circulated to control the buildup of impurities and maintain a processing solution of constant chemical balance. Such baths can be used indefinitely to produce consistent high quality coatings on aluminum at uninterrupted high production rates.

Formability of prefinished aluminum will lead to the production of chemically treated and painted strips and sheets at the mills of the basic aluminum manufacturers and in large job shop operations.

The cold phosphate systems for steel will undoubtedly have an even greater impact on the metalworking industry in 1959 than it did last year. The processes, which operate at about 100° F, have fully demonstrated that heat savings of 70 per cent and greater are possible. The phosphate coating materials coupled with effective low temperature cleaners will find increased use as the economies in heat, water, and electricity are more fully realized.

Platers Set Goal: Better Quality Control, Reduced Costs

—JOHN V. DAVIS

• Manufacturers are becoming increasingly interested in methods of quality control and the savings that it can bring about.

Quality control is of particular importance to a plater because his is usually the last operation performed on a product before packaging for delivery. Unfortunately, it is only after plating that previously overlooked defects are often found.

We have also noted that manufacturers are becoming more interested in cost savings that can accrue through changing from a bulk handling operation in plating to a straight line operation with frequent inspections. Handling is cut down, damaged pieces are reduced, and a considerable area of floor space can be made available for other purposes.

The automatic plater is in itself an assurance of higher quality because it reduces chances of human sequencing errors, governs times in process tanks exactly, and operates at a steady production rate.

Vapor Degreasing, Finishing Due To Be Integrated

—J. J. HARGARTEN

• A threshold to be crossed in 1959 is the integration of vapor degreasing with metal finishing processes, such as prosphatizing and nonflammable painting. Two developments will make this possible: Painting systems based on trichlorethylene-thinned paints, and a phosphatizing process in which trichlorethylene is the reaction medium. Integrated degreasing-finishing operations reduce over-all investment and operating costs as much as 50 per cent. They give promise of automated cleaning-phosphatizing-painting lines which will produce high volume, high quality work at low cost.

A revolutionary development in phosphatizing is the anhydrous phosphatizing process carried out in a trichlorethylene system. Combination of the anhydrous phosphatizing process with a prior vapor degreasing cycle will reduce the size of equipment needed and will minimize solvent and chemical costs. Operation of a nonaqueous system will sharply reduce utility costs because of the low latent heat of the solvent and because of the elimination of oven drying prior to painting. The low investment required for the smaller equipment will make automation practical in many places where it was overexpensive. Commercial application of the new anhydrous phosphatizing process will get underway early this year.

Integration of the two new finishing processes with vapor degreasing in one piece of equipment will follow.

Electroplating May Be Wed to Organic Protective Coatings

—H. C. IRVIN

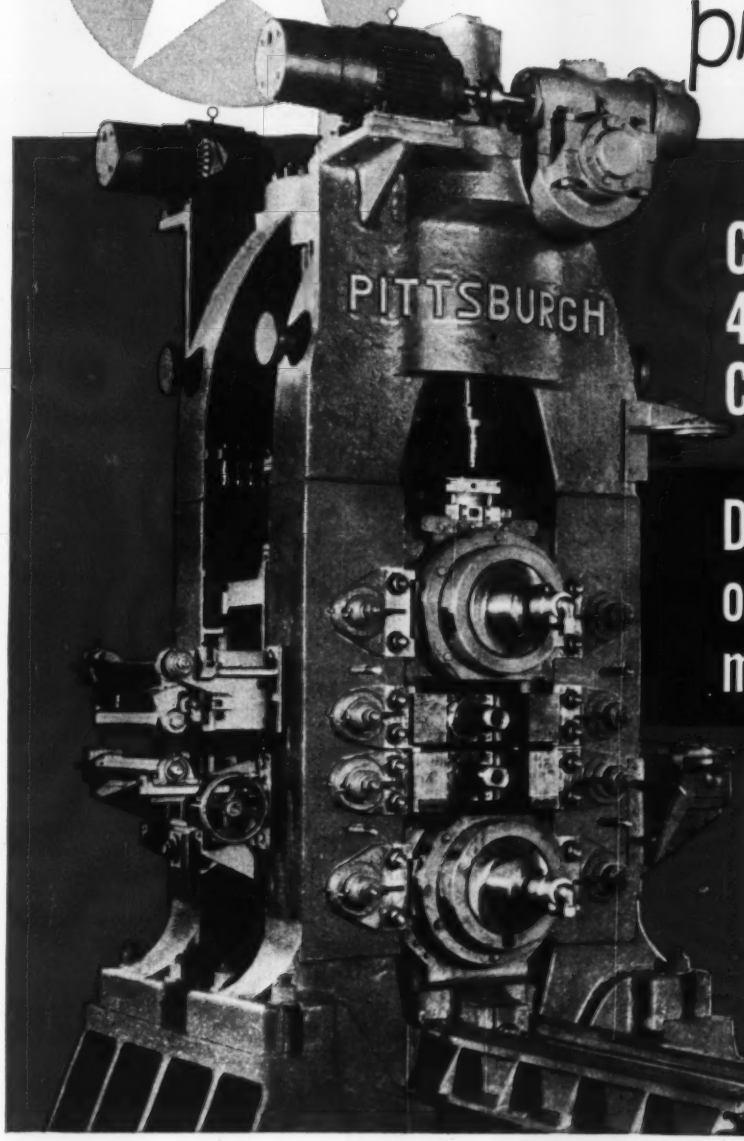
• We are engaged in promising research on the use of electroplated metals in unconventional combination with organic coatings for finishes that will combine decorative effects with best corrosion protection. There are encouraging signs of improved paint base preparations for steel for higher corrosion resistance as a basic requirement. Also, new methods of preparing metals for paint may increase the protectiveness of paint, as compared with plated coatings. Attention is also being given to the potential use of a bright acid zinc plate in copper-nickel-chrome systems with the prospect of greater corrosion resistance for decorative finishes.

In the field of mechanical finishing, it appears that a combination of mechanical and chemical finishing systems can appreciably reduce the handwork.

We believe our planning for new products cannot stop with the product itself. Where our product is part of a complete process, considerations must be given to operations or treatments before and after the use of the product. Methods, equipment requirements, and other factors affect the performance of the over-all process.

Process and equipment must be designed and planned together to provide maximum results at minimum cost.

PITTSBURGH presents—



Combination 4 High /2 High Cold Mill...

Does the work of two separate mills

"Precision" and "Versatility" are the words that best describe the new combination 2 High/4 High Cold Mill designed and built by PITTSBURGH to secure precision gauge, temper and finish for the ferrous and non-ferrous industries. As a 4 High Mill, it is used for cold reducing; as a 2 High Mill, it is used to acquire the desired temper and finish. Several desirable design features are incorporated to keep roll change time to a minimum. Low initial cost and economical operation are attractive plus values.

Heavy Machining Facilities

Our plant is equipped with a superior complement of well diversified machine tools that are available on a continuing basis for economical machining of heavy castings or the manufacture of auxiliary rolling mill equipment, such as heavy mill tables, furnace pushers, slab depilers, downcoilers, ingot buggies, slab transfers, etc.

PITTSBURGH
ENGINEERING & MACHINE
Division of Pittsburgh Steel Foundry Corporation
P.O. BOX 986, PITTSBURGH 30, PENNSYLVANIA
PLANT AT GLASSPORT, PENNSYLVANIA

FRED L. PLUMMER
National Secretary, American Welding Society, New York

A. N. KUGLER
Chief Welding Engineer
Air Reduction Sales Co.
Division of Air Reduction Co. Inc.
New York

A. L. JEROME
Plant Metallurgist
Caterpillar Tractor Co.
Peoria, Ill.

I. W. EVANS
Chief Welding Engineer
Morgan Engineering Co.
Alliance, Ohio

1959 FORUM ON TECHNICAL PROGRESS

Joining and Assembly

Industry Eyes Ultrasonic Welding, More Automation

—FRED L. PLUMMER

• All indications point to more welded fabrication. Accelerated research, made necessary by nuclear power and high temperature operations, will uncover new materials and new welding processes.

Ultrasonic welding will be used for more materials and greater thicknesses. New refractory materials and special alloys will be developed and welded to meet the extremely high strength, high temperature, low weight requirements for rockets, missiles, and planes.

This week, the American Welding Society became American Secretariat for the International Institute of Welding, which represents 27 nations. By participating in this activity, industries in the U.S. can exchange welding information and assist in the development of the standards, codes, and procedures under which we may have to compete in both domestic and world markets. To supplement that program, the society has established a department to provide information and technical aid to metalworking industries.

Modern fabrication methods call for closer tolerances, greater accuracy, and higher skills. New techniques are based on greater mechanization—use of more automatic and semiautomatic welding processes with carefully designed and frequently extensive jigs and fixtures.

Suggests Broader Application Of High Temperature Brazing

—A. N. KUGLER

• The most important development in brazing will be the size and scope of furnace brazing with inert atmospheres.

Although high temperature brazing is used almost exclusively for honeycomb components, there is no reason why it will not soon find use in other industries where high service temperatures are required.

We need new brazing alloys which will permit flow control at brazing temperatures.

Present alloys are suitable to about 700° F. An alloy which will perform at 1000° F is needed—and it looks like such materials are on the way.

User Offers Recommendations To Makers of Welding Products

—A. L. JEROME

• Welding offers many economical answers to complex design problems. But much remains to be done in more practical approaches. Increased use of high strength materials will stimulate interest, and supply a real challenge.

There is need for basic weld standards which are more closely linked with applications. They also must be commonly understood and accepted—that way a fabricator can encourage the designer to apply welding and to look to the manufacturer of welding products for assistance.

We ought to have enough flexibility in composition to get the strength, soundness, and workability we want in a weldment. We need more consistent ways to evaluate weld products and to correlate them with destructive laboratory and field tests. Until then, we will be only estimating weld performance.

Other needs include: More practical recommendations of the power source for each electrode to obtain the most efficient depositions; study of the effects of various heat inputs on high strength steels; ways to substitute automatic, semiautomatic, and resistance for manual, open arc welding; standards to govern the feedability of electrode wire; and the elimination of weld porosity, or more realistic tolerances.

Positioners, Fixtures Offer New Route to Savings

—I. W. EVANS

• Welding has reached the age of general acceptance. All emphasis is on new processes, such as CO_2 welding, semiautomatics, and automatics. Fixturing is still one of the main problems that require investigation. The majority of welding jobs will be done manually for some time. Iron powder electrodes help manual welding retain a great deal of its advantage and versatility. It is difficult for automatics

J. BYRON JONES
President, Aeroprojects Inc.
West Chester, Pa.

WILLIAM G. WALTERMIRE
Chief Product Engineer
Lamson & Sessions Co., Cleveland

RALPH S. BATTLES
President, Judson L. Thomson
Mfg. Co., Waltham, Mass.

A. F. DAVIS
Vice President
Lincoln Electric Co., Cleveland

to reach restrictive areas and to justify the expense where duplication is unusual.

Positioning is where great economies can be effected. Most equipment requires lengthy, expensive setups to fasten the workpiece. More attention should be given to that area.

We hope that someone will develop a simplified tracing device for the submerged arc process or CO_2 welding for complicated shapes.

The picture also looks bright for the development of new welding techniques for the more recently developed alloys.

Look for Big Advances In Ultrasonics Technology

—J. BYRON JONES

• Ultrasonic welding is handling new and difficult joining problems. Here are some highlights of what's being done and what's ahead:

Aluminum foil packages can be sealed at high speeds. Roller-type equipment makes seamwelds which meet rigid helium-leak specifications. Equipment to handle heavier aluminum is on the way.

Such welding does not demand extensive precleaning. Equipment installation is inexpensive, and power demands are low.

Better transformers and lower cost motors are made possible by joining aluminum foil to copper terminals. Such joints often can be made without stripping insulation.

Higher quality, cheaper transistors are made possible by joining fine aluminum and gold wires to germanium and silicon without heat or electric current. (Sparking or sputtering of resistance welding contaminates high-purity materials.) Similar encapsulation of semiconductors is practical.

Bridgewire assemblies, detonators, and electrical parts can be used at higher temperatures. Solder formerly restricted use to low temperatures.

Junctions of dissimilar metals are feasible (for example, stainless to aluminum or titanium). This means high quality, lightweight structures that will stand up to high temperatures. Ultrasonic bimetal welds avoid the metallurgical mixtures which have the unknown corrosion susceptibility of fusion methods. (Galvanic coupling, of course, is still present.)

High temperature metals like molybdenum, beryllium, 17-7 PH stainless are increasingly important to the Space Age. Joining them without reducing their strength is imperative. It is possible to join such metals without high weld zone temperatures or reduction of essential properties, but more research is needed.

Ultrasonics has enormous potential in many other metalworking fields besides welding, cleaning, soldering, and brazing. Examples: Much has been done with metallurgical degassing, grain refinement, diffusion, and dispersion.

Here are some general developments coming within the next five years:

1. Ultrasonic vibration will satisfactorily disperse solid metal and refractories throughout a melt as it freezes in the mold. The method will produce alloys which are today thought difficult.

2. Ultrasonic vibration applied to molten baths will produce hot strip coatings and improve quality.

3. Ultrasonic vibration impressed on a cutting edge, chipmaking tool (like those on lathes and planers) can cut power requirements, increase speed, and improve surface finish. (Reason: Cutting a slice of bread is easier if you move the knife back and forth—we call it oscillatory shear.)

4. Other high force application, like drawing, extrusion, pressing, and similar squeeze-forming operations, can become easier with ultrasonic vibration. Such applications require further development.

A new device which puts ultrasonic energy where you want it more efficiently has much to do with the success of metallurgical applications like those just mentioned. We call it a "force insensitive, transducer coupling system." You don't lose such large amounts of vibratory energy through supporting members of such a system. Other problems like frequency shift and resonance are eliminated.

Predicts Wider Acceptance Of Thread Standard

—WILLIAM G. WALTERMIRE

• Now is the time for manufacturers to review their fastener and special product designs. New processes like impact extrusion have changed our concepts of what can be made by extruding, heading, and rolling. Old barriers are falling fast: Some gains in quality, cost, and material savings are fantastic.

As 1959 progresses, fastener people expect industry to extend the inch-using unified screw thread downward to #0, to accept the entire range as an international standard, and to develop international standards for gases and gaging practices.

We have every reason to believe that '59 will be a banner year, as well as a forerunner of still greater production in the future.

Calls for Higher Quality Rivets at Lower Cost

—RALPH S. BATTLES

• Customers will continue to demand more speed, higher quality, and lower costs. Such requirements can't be met without the full co-operation of those supplying our basic materials. A precision rivet cannot be made without quality materials.

Industry doesn't buy the rivet alone. The tendency is to be more concerned with a package: Engineering, production method, rivet setting machinery, and the rivet.

High Inspection Costs Hamper Welding Progress

—A. F. DAVIS

• Most welding developments have been putting more control into the machine and less in the operator's hands. Costs

Joining and Assembly

H. F. HENRIQUES
Vice President, Marketing Services
Air Reduction Sales Co., division of
Air Reduction Co., Inc., New York

DR. F. R. HENSEL
Vice President, Engineering
P. R. Mallory & Co. Inc.
Indianapolis

ROBERT C. SINGLETON
Vice President, Engineering
Nelson Stud Welding Div., Gregory
Industries Inc., Lorain, Ohio

J. V. LESTER
Treasurer, Standard Pressed
Steel Co., Jenkintown, Pa.

are reduced, and quality is more consistent.

The introduction of such advances creates technical problems, but welding must also clear another hurdle: Finding better ways to inspect and how to interpret what is observed by an inspector. Inspection costs frequently exceed those of welding, and much of the cost advantage of new processes is lost. In many states, for example, the question of inspection is adding considerable cost to welded bridge construction.

Stainless Powder Electrodes Have Big Potential

—H. F. HENRIQUES

• Several recent developments are bound to have tremendous impact on metal fabricating. They include special power supplies and process techniques for the gas shielded, metal arc welding like the CO_2 process, and the availability of low alloy steel wire which can weld high strength, notch-tough steels.

Metal powder, stainless steel electrodes will be a great boon. New iron powder type electrodes improve weld quality, are easier to handle, and provide faster rates of deposition. At the same time, they fulfill the rigid requirements of new government specifications.

One of the most urgently needed construction developments is an improved way to control quality and economy in field welding. There is a trend to limit the use of welding to shop fabrication and to make field connections with high strength bolts.

Another urgent need involves brittle fractures in pressure vessels and large field-erected structures: A proper correlation between the results of laboratory tests and the behavior of structures must be established. Lack of information on the correlation of test results causes undue conservatism, which needlessly increases costs. Fundamental information is needed to define the importance of various factors that might contribute to brittle failure, including: The properties of steel materials and welded joints, influence of welding procedures and fabricating methods, details of design, residual stresses, and heat treatments.

Tough Metals Will Gain During the Next Decade

—DR. F. R. HENSEL

• Interest in refractory transition metals (tungsten, molybdenum, tantalum, columbium) has increased greatly. They will open up new horizons in many fields, particularly in high temperature structural materials. New approaches in melting, advances in powder metallurgy, and stepped-up research will stimulate their use.

Example: Electron beam melting which produces high purity materials under high vacuum. (Heat comes from a gun which bombards the stock with electrons.) From the production standpoint, this process has important advantages. The material can be in ingot, powder, flake, or sponge form, and the process can be stopped or started at any time.

Looking several years into the future, one cannot help but see great promise for refractory metals, not forgetting vanadium and chromium.

A new high temperature titanium alloy represents a significant technical stride. A substantial price reduction will make it more attractive.

During the next decade, we think that all these metals will grow in importance.

Improvements in Studwelding Will Broaden Applications

—ROBERT C. SINGLETON

• You will see studs of larger diameter commercially available this year. Flux filled, $\frac{7}{8}$ in. studs will be readily handled with portable equipment. Studs $1\frac{1}{4}$ in. in diameter will be used in the shop—present upper limit is 1 in. The larger studs will be especially useful in composite steel and concrete bridges and buildings as standard as shear connectors. The larger sizes will offer economies to forgers.

Look for gains in aluminum studwelding and a collar stud for attaching metal roofing and siding to steel buildings.

Suggests Bolder Outlook Will Produce Better Fastener

—J. V. LESTER

• With the increasing complexity of mechanisms, the small fastener casts a long shadow on the success or failure of an assembly. Manufacturers of threaded parts can no longer consider their processes adequate. Closer tolerances will be demanded, along with higher strength and longer life.

Automation and greater service from all end products highlight the need for reliable fastenings. Standards will be raised to new levels, and reliability information covering components will become a necessity.

We must aim for a better product, not by mere percentages, but by a genuine increase. We know it is feasible to make fasteners for advanced applications with tensile strengths up to 300,000 psi. That's almost twice the strength of the best fasteners several years ago. Fatigue strength

YOU GET PRECISION FASTENING AT MASS PRODUCTION COSTS...

. . . when Thomson becomes your fastening partner.

In the Thomson line of more than 8,000 rivet designs, you'll find the semi-tubular, deep-drilled, bifurcated (split), shouldered or compression rivet that will give you the best strength-cost ratio in the fastening field. Produced to the industry's highest quality standards at production rates exceeding 20,000,000 rivets a day, these low-cost fasteners merit serious consideration in your product-improvement and cost-reduction programs.

Our leadership in solving fastening problems with quality rivets and precision rivet-setting machines since 1885 is at your service. What is your problem?

JTL

JUDSON L.

THOMSON

MFG. CO., WALTHAM 54, MASS.

Joining and Assembly

JOHN J. CHYLE
Director, Welding Research
A. O. Smith Corp.
Milwaukee

A. F. CHOUINARD
Director, Research & Development
National Cylinder Gas Div.
Chemetron Corp., Chicago

G. N. WILLIAMS
General Manager
Fusion Engineering Co., Cleveland

A. M. SETAPEN
Manager, Brazing Div.
Handy & Harman, New York

in the same time has gone up in proportion.

The key to the future lies in bold individual interpretation. To produce a fastener that will really perform calls for a new look at machines and men.

The "sixties" may well become the decade of reliability. Certainly, the little things will gain increasing importance; functional failures, though more likely, will be reduced. Emphasis in the fastener industry will be on more standard and interchangeable parts and greater dimensional fidelity.

Two Welding Methods Lead: CO_2, High Cycle Resistance

—JOHN J. CHYLE

• The carbon dioxide welding process will become increasingly important in fabricating carbon steels.

Carbon dioxide spotwelding has aroused considerable interest and undoubtedly will find a place in joining light sections, particularly in automobiles. It looks equally good for tackwelding and strength welds. To a certain degree, it may compete with conventional resistance spotwelding.

There are modifications of the CO_2 process, which incorporate flux. They will probably find a limited field in metal fabrication.

High cycle resistance welding is of great interest. Developments are rapidly being made. It has vast possibilities for light gage materials. Speeds of 1000 fpm in 0.012 in. metal are a fact. Mills making brass, copper, copper alloy, and aluminum tubing products are in production with this new process. Welding speeds are quite high.

Aircraft people are putting a lot of effort into honeycomb sandwich construction. Marked improvements have been made in the brazing, which will mean that large areas of honeycomb will be in the newer aircraft.

Honeycomb progress has upgraded the brazing alloy itself. High temperature, high strength fabrication is on the threshold of production success.

Iron powder electrodes continue to move toward higher speeds and higher deposition rates.

Progress of Welding Tied to Automatic Controls

—A. F. CHOUINARD

• Improvements in welding depend on our ability to further mechanize oxygen cutting, to improve arcwelding, and to develop better inspection techniques.

Some improvements have been made, but they should be regarded as guideposts.

Recent developments in gas cutting torches and tips have improved flame cutting. The next step is in machines: Some of them can photoelectrically trace an ordinary line drawing which eliminates the need for special templates.

Future improvements must combine the versatility of present machines with techniques being developed in automatic controls.

A basic arcwelding improvement started with CO_2 gas shielding a bare wire electrode to replace conventionally coated electrodes. That caught on quickly because the welder can see what he is welding, and put down more weld metal.

The next step was to add flux in the core of the wire. That opened up a new vista of electrode design. Flux-cored electrodes have allowed the designer to properly proportion his ingredients and to deliver them directly to the weld pool.

Improvements have been made in the last few years in both methods and equipment for inspecting welds. Properly used, they clearly indicate weld quality. The industry can use faster methods of nondestructive testing.

Cites New Opportunities for Paste Brazing and Soldering

—G. N. WILLIAMS

• New automation processes for silver brazing and soft soldering are rapidly being developed to fit new process developments. In large measure, the advances have been made possible by the several new (ST) brazing paste alloys which can be varied to fit each job.

In the past, such paste solders sometimes required elaborate setups. Simple, inexpensive automatic and hand applicators can dispense an exact "preform" of paste to the parts as they are fed to the heat source. Automatic heating devices then complete the brazing cycle.

Soldering developments hold promise of breaking 50 years of low efficiency.

Coming: Better Filler Metals To Resist High Temperatures

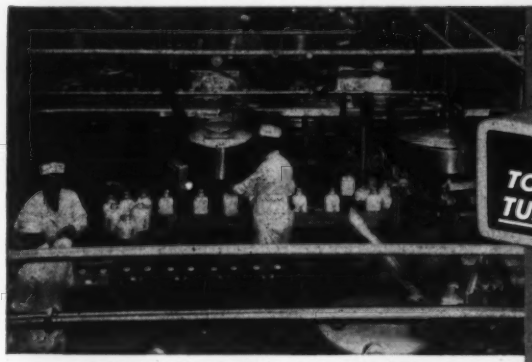
—A. M. SETAPEN

• The steady rise of operating temperatures in supersonic flight power reactors increases the need for joints capable of holding up at 1800° F. Makers of brazing alloys are concerned with broadening the variety of filler metals.

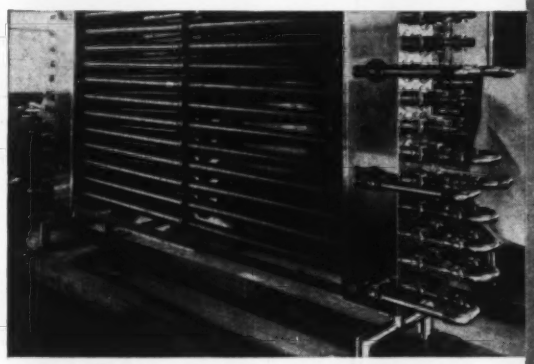
Work in progress should result in several new ones to supplement the nickel-chromium-boron-silicon alloys.

Although high nickel materials are strong and oxidation resistant up to about 1900° F, they tend to dissolve

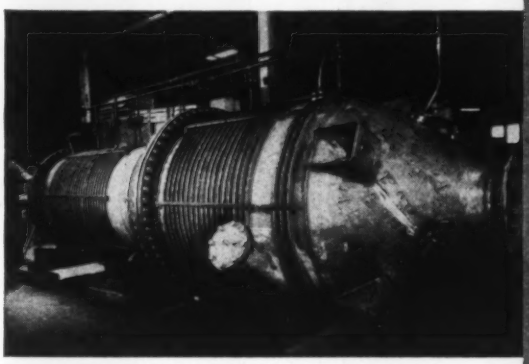
(*Please turn to Page* 369)



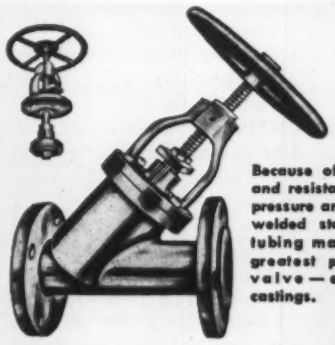
In dairy products, sanitation, non-contamination, heat and cold requirements dictate *welded* stainless steel tubing.



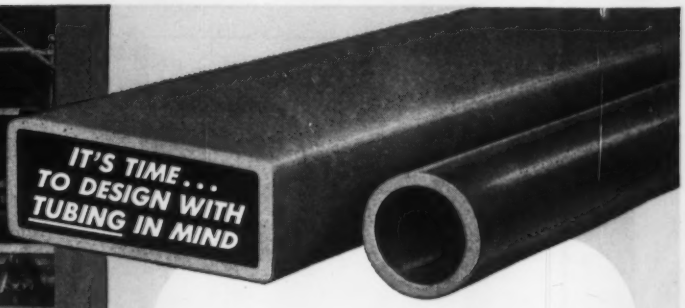
The uniformity, concentricity and dimensional accuracy, and easy fabrication of welded tubing serve best in this condenser.



This all-stainless steel resin distillation unit relies on *welded* stainless steel tubing for all tubular components.



Because of formability and resistance to heat, pressure and corrosion, welded stainless steel tubing makes up the greatest part of this valve—eliminates castings.



WHEN YOU MUST COMBAT

- CORROSION
- HEAT
- CONTAMINATION

USE WELDED STAINLESS STEEL TUBING

Where corrosion means contamination or failure—where instant sanitation is a must—where temperatures and pressures combine as key factors—where lifetime beauty and durability spell economy—use *welded* stainless steel tubing.

In all these applications for tubing, the uniformity, concentricity, dimensional accuracy and wide range of sizes, shapes and grades of *welded* stainless steel tubing serve best.

It's time to design with tubing from your quality *welded* tube producer.

FORMED STEEL TUBE INSTITUTE

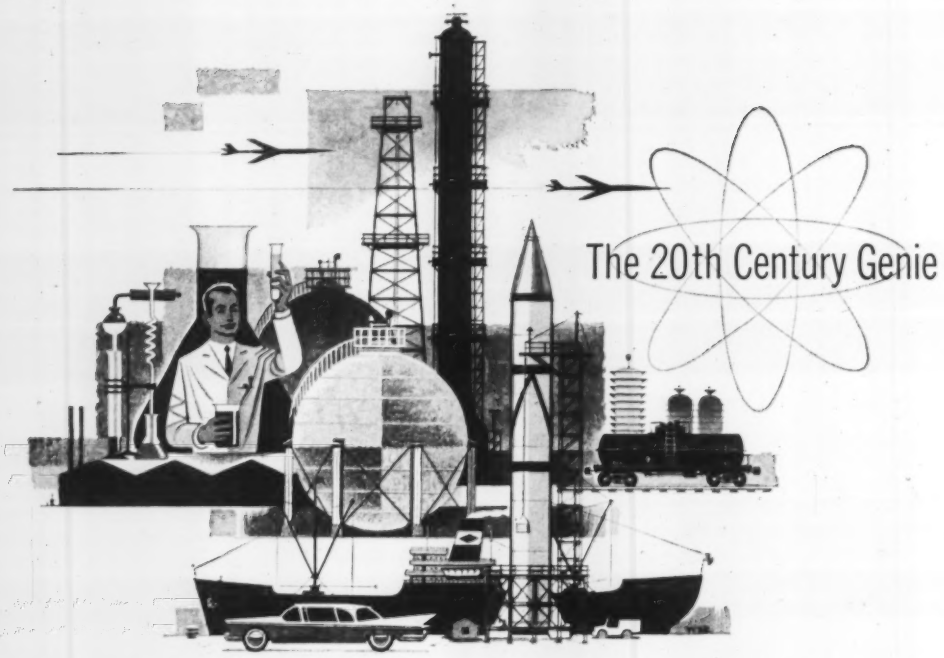
Specific information on welded tubing is available on request to:

FORMED STEEL TUBE INSTITUTE

850 HANNA BUILDING • CLEVELAND, OHIO

An Association of Quality Tube Producers

LC-585



HARSHAW FLUORIDES

One of the largest facilities in the world for the manufacture of fluorides makes available a long list of Harshaw quality fluorine compounds. If required, you are invited to draw on the knowledge and experience of our staff of technical specialists on fluorides. We have a background of more than forty years experience as a major producer.

BORON TRIFLUORIDE
HYDROFLUORIC ACID
ANHYDROUS . . . AQUEOUS

Ammonium Bifluoride
Ammonium Fluoborate
Antimony Trifluoride Sublimed
Barium Fluoride
Bismuth Fluoride
Boron Trifluoride
Boron Trifluoride Complexes
Cadmium Fluoborate
Chromium Fluoride
Copper Fluoborate
Fluoboric Acid
Fluorine Cells
Fluorinating Agents
Frosting Mixtures
Hydrofluoric Acid Anhydrous
Hydrofluoric Acid Aqueous
Hydrofluosilicic Acid
Lead Fluoborate
Lithium Fluoride
Metallic Fluoborates
Nickel Fluoborate
Potassium Bifluoride
Potassium Chromium Fluoride
Potassium Fluoborate
Potassium Fluoride
Potassium Titanium Fluoride
Silico Fluorides
Sodium Fluoborate
Tin Fluoborate
Zinc Fluoborate
Zinc Fluoride

THE HARSHAW CHEMICAL CO.
1945 EAST 97TH STREET • CLEVELAND 6, OHIO

CHICAGO • CINCINNATI • CLEVELAND
DETROIT • HASTINGS-ON-HUDSON, N.Y. • HOUSTON
LOS ANGELES • PHILADELPHIA • PITTSBURGH

Joining and Assembly

DAVID SCIAKY
President, Sciaky Bros. Inc.
Chicago

E. F. HESS
Product Manager, Adhesives
Coatings & Sealers Div.
Minnesota Mining & Mfg. Co.
Detroit

LAURENCE H. FLORA
Director of Sales
Tinnerman Products Inc.
Cleveland

JOHN S. DAVEY
Vice President, Research & Engineering
Russell, Burdsall & Ward Bolt &
Nut Co., Port Chester, N. Y.

and penetrate stainless steel, ruling out use on thin gage structures. Another problem: They form brittle intermetallic compounds with the base metal.

Four filler metals are in use or under test for 800 to 1800° F service: Gold-nickel, gold-nickel-chromium, palladium-nickel-chromium, and manganese-nickel. The first two offer the same advantages as high-nickel alloys without their limitations. The material is costly, but the applications requiring high temperature reliability far outweigh the cost factor.

Palladium-base alloys may be a good compromise material where high costs are a factor. One composition (palladium-nickel-chromium) has a flow point of 2300° F, the same service temperature as gold-nickel-chromium, and is reasonably ductile.

Manganese-nickel is getting established for moderately elevated temperature service above the range of silver-copper. It has a flow point of 1870° F, offers good strength to about 1600° F, when not subject to oxidation. It can be used at 800 to 900° F in a moderately oxidizing environment.

Marketing Problem Outweighs Need for Technical Growth

—DAVID SCIAKY

• The outlook for resistance welding does not depend on technical development. It is already far beyond present needs.

Industry's acceptance of the process is the key. Efforts to upgrade proper applications are just beginning to show results. The key to our future still lies in the ability to fasten safely and positively.

Nonaviation manufacturers offer real potential.

The development of equipment will no longer suffer from restricting such activities to the user's own staff. They will depend more on the machine builder.

In aviation, progress in resistance welding seems to have reached a plateau. Attention is turning to the exotic forms of automatic fusion welding.

Practical production of sandwich structures is yet to be solved. Fabrication of all steel aircraft is going toward a combination of automatic fusion welding and resistance welding.

The new steel alloys are easier to resistance weld than aluminum alloys.

The outlook is bright. We must emphasize our efforts to pioneer.

Instantly Curing Adhesives Sought for Production Lines

—E. F. HESS

• High strength structural adhesives will make appreciable gains in the next three years.

Aircraft designers look forward to when all mechanical fasteners can be replaced with adhesives.

Adhesives for high temperature applications are important to the progress of this joining method. Structural adhesives have maintained good strength at 400° F. The limit is expected to reach 600° F soon.

Instantaneous curing methods for high strength structural adhesives are being sought for production operations.

Use of new film adhesives will increase in the next few years. They meet the need for a high strength adhesive with simple application procedures. Film adhesives have uniform thickness throughout the joint, confine themselves to the immediate bonding area, and are clean. They don't contain solvents; waste and shrinkage are avoided. Some films won't disintegrate at 10,000 psi. They will hold 1000 psi at 500° F.

Looks for New Fasteners To Cut Assembly Costs

—LAURENCE H. FLORA

• Estimates show that assembly accounts for about 30 per cent of total costs. (Some jobs can run to 80 per cent.)

Going into 1959, fastening has gone a long way beyond nut and bolt methods. New techniques greatly simplify and accelerate assembly by cutting down the number of parts being handled.

Special spring steel fasteners perform many other functions beside fastening.

Such multiple service will bring more economies during the coming year. New fasteners types are being developed.

Three Reasons Cited for Fewer Standard Fasteners

—JOHN S. DAVEY

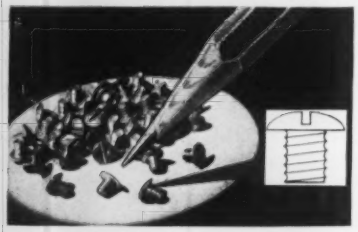
• Despite special purpose fasteners, there is a long term trend to fewer standard types and sizes of nuts and bolts. Reasons: They are simpler, cost less, and are easier to replace.

Assemblers' standardization on hexagon heads has already replaced square heads and nuts. Eventual goal of this standardization program: Two fastener combinations to meet all applications, except Spin-lock bolts and nuts. They will do the same jobs now done by a dozen combinations at less cost.

Association fastener standards are due

IT PAYS TO MAKE GOOD CONNECTIONS
HUBBELL
Manufacturers of Cold Headed Fasteners Since 1888

OVER **5** TIMES THE RATE
AT **45%** LESS COST



Another example of how Hubbell Cold Heading produces Better Parts at Faster Speeds, at Lower Cost

THE PART:
Special 1-64 Miniature Binding Screw

THE MATERIAL:
18-8 High Tensile Stainless Steel

THE METHOD:
Hubbell Cold Heading in place of screw machining

THE RESULT:

a. Production increased from original rate of 7000 pc. p.d. to cold heading rate of 40,000 pc. p.d.

b. Cost reduced 45%

c. Finer Quality—More Economical Production

1. Higher Tensile Strength
2. Cleaner, Stronger Threads
3. No Scrap Waste
4. No Separation from Chips

Hubbell Cold Heading may provide equally dramatic results for you. Whether it is presently cold headed or not, send blueprint of part or sample for analysis and estimate.

HARVEY HUBBELL, Inc. *Machine Screw Dept.*
Bridgeport 2, Connecticut

Kindly estimate on the enclosed Sample (Blueprint). Quantity .....

Name .....
Title .....
Company .....
Address .....

Joining and Assembly

A. WATSON ARMOUR III
President, Huck Mfg. Co.
Detroit

for some changes. Some call for overdesigning in 60 per cent of the cases. Since changing thread dimensions and distance across flats would create interchangeability problems, reduction of nut thickness is most likely.

Heat treated bolts continue to gain favor. They cost less than cap screws and machine bolts.

The trend toward heat treated bolts highlights greater understanding of fasteners.

Emphasis on proper assembly has also accelerated a trend to power wrenches and mechanized assembly.

High strength bolting techniques are moving into the repair and upgrading of equipment. Fabricators of buildings, bridges, and railroad and heavy construction equipment will use more high strength bolts.

Fasteners Needed for Service At High Temperatures

—A. WATSON ARMOUR III

• The trend toward fasteners capable of working in higher temperatures is expected to continue throughout 1959. Among the newer fasteners meeting that need is a Conical Keystone Lock (CKL) blind rivet made of Monel. Now a prototype, it is expected to qualify for 1000° F service.

Hole-sizing fasteners, which automatically bring drilled holes to precise size during installation, are products of a brand new concept. They will be used in interference fits for leakproof construction. The performance permits use

FORMULA FOR REDUCED ASSEMBLY COSTS

Take a low-cost fastener like Milford Tubular Rivets. Feed and Clinch with precision Milford Riveters and you multiply the cost savings inherent in tubular rivets. See Milford for all sizes, styles and finishes of tubular rivets... See Milford for a complete riveter line. For the answers to assembly problems *get in touch with Milford first!*

THE MILFORD RIVET & MACHINE CO.
MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

2 to 3 times
Greater Thrust Capacity

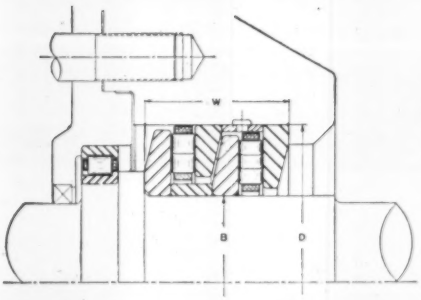
8 to 12 times
Longer Life Expectancy

New ROLLWAY
TANDEM THRUST BEARING

Using axial space along the shaft, rather than enlarging the housing diameter, this new Rollway tandem thrust bearing distributes the load over two or three stages of roller components. Gives 2 to 3 times more thrust capacity than conventional thrust bearings. Life expectancy is 8 to 12 times longer depending upon the number of stages.

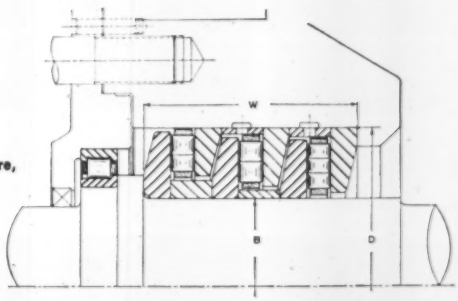
Each stage comprises a rotatable bearing plate . . . a bronze retainer with thru-hardened steel rollers . . . a compression sleeve . . . and a stationary bearing plate. The thrust load is applied to the first stage and is by-passed by each compression sleeve in turn to the remaining stage or stages.

Calculated deformation of the bearing plates distributes the load uniformly on all rollers. A greater number of rollers in the first stage carries about 60% of the load, without increasing the load per roller. Compression sleeves have cross-sectional areas proportional to the load imposed. Roller variance is held within one ten-thousandth inch.



✓ **TWO STAGE TANDEM**

22 sizes, up to 17" bore, 34" O.D., and 2,325,000 lb. capacity at 100 rpm



✓ **THREE STAGE TANDEM**

5 sizes, up to 17" bore, 34" O.D., and 3,410,000 lb. capacity at 100 rpm

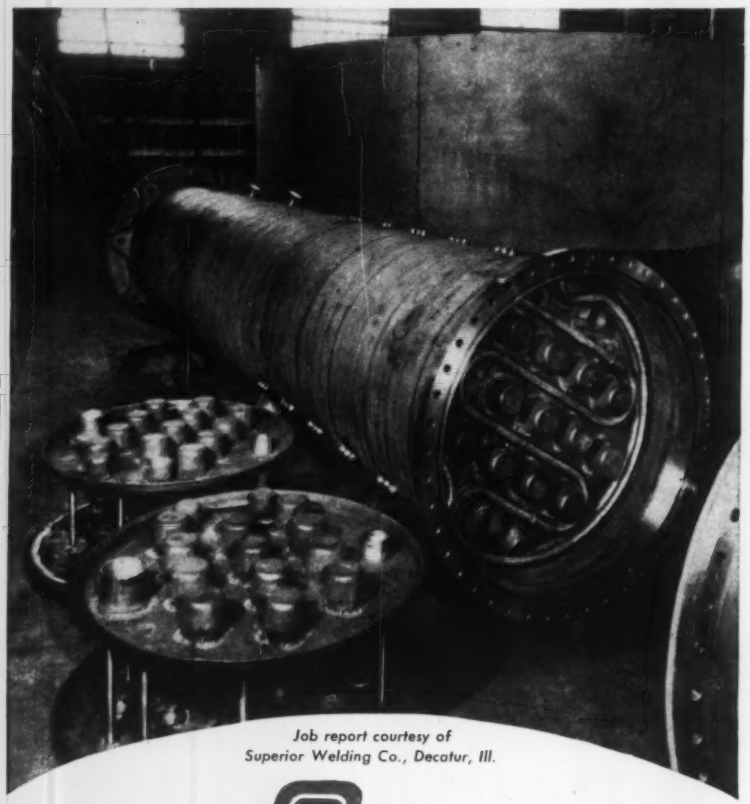
Complete Specifications on Rollway Tandem Thrust Bearings, as well as other up-to-date information on bearing design is yours for the asking. See your Rollway engineer, or write: Rollway Bearing Company, Inc., Syracuse, N. Y.

Tandem Thrust Bearing manufactured by Rollway Bearing Company, Inc. under U.S. Patent Number 2,374,820.

ROLLWAY®
BEARINGS
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Chicago • Toronto • Cleveland • Seattle • San Francisco • Boston • Detroit • Pittsburgh • Houston • Philadelphia • Los Angeles

When corrosion is a threat to the life of Stainless Welds



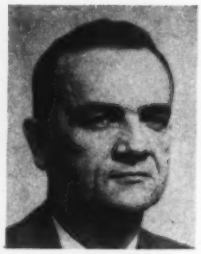
Job report courtesy of Superior Welding Co., Decatur, Ill.

WELD WITH ARCOS

STAINLESS ELECTRODES

This is a nitric acid absorption column for the chemical industry. The shell and flanges of solid 304 ELC stainless were welded with Arcos CHROMEND 19-9 Cb Electrodes to resist chemical attack at 150 p.s.i.g. and 300°F. Arcos CHROMEND K-LC Electrodes were used for welding the bubble caps and coil clips. Together, these two Arcos Electrodes proved the point: there's no substitute for quality weld metal when long uninterrupted service is essential. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

Joining and Assembly



J. F. GALBRAITH
Manager, Electric Welding Dept.
Linde Co., division of Union Carbide Corp., Newark, N. J.

of hand-held drill motors, producing substantial reduction in production costs and eliminates secondary reaming or broaching.

New shouldered blind rivets and Huckbolt fasteners are being developed for the honeycomb applications.

This year, we expect to see inroads into highway bridge and industrial building construction. High tensile Huckbolts (⅝ and ¾ in.) are on the way. One structural application has been completed.

The market for quality fasteners that offer something more than the simple screw or nut and bolt is growing. (We have multiplied output 12 times in eight years.) The answer is adequate research and development facilities.

Small Wire Welding Extends Usefulness of Fusion Method

—J. F. GALBRAITH

• Pilot arc spotwelding is a major advance in the fabrication of missile components. It eliminates high frequency for starting, provides a high degree of weld consistency, and improves the weld by its postheating effect.

In one application, it welds stainless steel missile fins in an automated, tape controlled machine. The same principle is used to make high quality manual welds. The process will find wide usage in sheet metal fabrication and honeycomb panels.

Small wire welding (3/64 in. down to 0.015 in.) using the new inert gas, shielded short arc technique is now well established. It works extremely well in all positions on all metals 0.030 in. to

Joining and Assembly

GEORGE A. TINNERMAN
President
George A. Tinnerman Corp.
Cleveland

0.125 in. thick. New welding equipment, power supplies, and techniques will establish welding in areas not previously useful. Outstanding examples: Welding of truck cabs and corner posts on automobiles, air conditioning ducts, furnace parts, tank ejector units for jettison fuel tanks, steel desks, mail bag frames made from light-gage tubing, and stainless steel capacitor cans.

The process has proved itself on stainless, carbon, and galvanized steel. In these areas, it is faster than Heliarc welding and more economical than covered electrodes.

Rising Construction Costs Spur Need for Fasteners

—GEORGE A. TINNERMAN

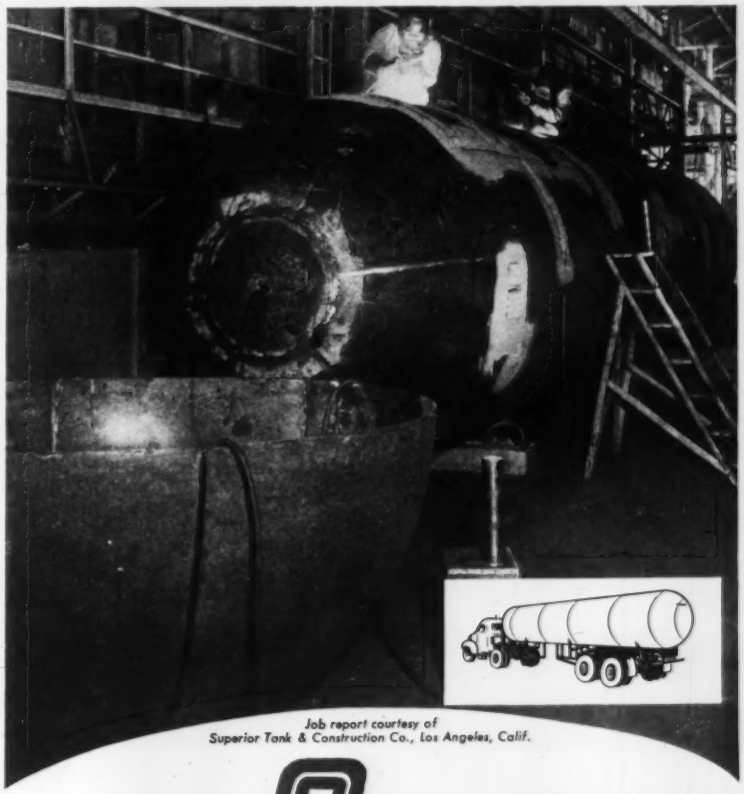
• Building authorities look for cost increases of about 5 per cent in 1959. Their prediction points up the need for the development of new fasteners and fastening techniques.

Contractors are enthusiastic about fasteners which can be used without any special equipment.

One was introduced last year. It costs less than 18 cents and replaces conventional rod hanger clamps which cost 30 to 56 cents and require two to three times longer to install.

By concentrating on such fasteners and licensing qualified manufacturers to produce them, we can do much to offset the upward cost trend. Seemingly little things like clamps and hangers have influence on costs far out of proportion to their sizes.

How X-Ray Quality Welds Make Low Alloy Steels Pay Off



Job report courtesy of Superior Tank & Construction Co., Los Angeles, Calif.

WELD WITH ARCOS

LOW HYDROGEN ELECTRODES

The vessel being welded is part of an L.P.G. tank truck. For high strength with low weight—USS "T-1" steel is used and welded with Arcos Ductilend 110 Electrodes. These tanks meet or exceed ASME code requirements . . . and all Ductilend 110 welds qualify with X-ray soundness. Ductilend 110 is an Arcos Low Hydrogen Electrode especially developed for welding high strength notch tough steels of the 110,000 psi tensile strength range. Data sheet on request. ARCOS CORPORATION • 1500 South 50th Street, Philadelphia 43, Pa.

H. B. CARPENTER
Senior Engineer, Esso Standard Oil Co., New York

ROBERT F. RICE
Manager, Crane Dept., Whiting Corp. Harvey, Ill.

E. W. FRANZ
Secretary, May-Fran Engineering Inc. Cleveland

ROBERT H. DAVIES
Vice President, Industrial Truck Div., Clark Equipment Co. Battle Creek, Mich.

1959 FORUM ON TECHNICAL PROGRESS

Handling and Packaging

Rust Preventive Emulsions To Gain Popularity in '59

—H. B. CARPENTER

• New emulsifiable petroleum base products will continue to create considerable interest as rust preventives for indoor protection of ferrous metal parts in process or packaged for shipment. They furnish protection equal to that provided by light solvent cutback rust preventives. They also neutralize corrosive fingerprints, leaving a residual film which protects against corrosion during later handling.

Emulsifiable types eliminate the fire hazard which is sometimes associated with solvents. They can be applied by dipping or spraying to surfaces wet with water or emulsified cutting oil. The film is a lubricant in nature; except in unusual cases, it does not have to be removed before the part is put in service. It can be removed easily with a petroleum solvent if necessary.

Conventional soluble oils used in machining and grinding have some rust preventive properties (attempts to improve them have not been particularly successful) but they do provide lasting protection.

Satisfactory performance has been obtained from modified petroleum base rust preventives that form stable emulsions when mixed with water.

Additives inhibit the corrosive action of the water until it evaporates, leaving a protective film.

Some emulsifiable products leave an oily film. Others deposit a semisolid, greaselike film which does not run off or rub off through contact with packaging material.

Both films are thin and transparent; if the film must be seen, a dye can be added to the preventive.

Look for Automatic Cranes, More Accurate Controls

—ROBERT F. RICE

• Accurate, automatic control systems will be used on more overhead traveling cranes in the next few years, especially where extreme accuracy is required.

Progressive manufacturers are looking for more ways to reduce the cost of material handling. In any manufacturing process that includes a repetitive route or motion, costs can be cut with an automatic crane, releasing the crane operator for other work.

Several electrical manufacturers have recently announced improved crane controls. Example: Hoist motor types that cause the motor to produce the required torque and speed without electrical or mechanical retarding brakes.

Expansion in Material Handling Facilities Forecast

—E. W. FRANZ

• More companies are expected to make changes in material handling methods in 1959. As building costs continue to rise, it becomes imperative that every square foot of production, assembly, and storage area be used to advantage. Plant expansions are often unnecessary if the proper production and handling tools are applied in present plants.

In 1958, we all learned where and how to cut the "fat" from overhead. Management has come to appreciate what efficient material handling can do in cutting product costs.

While expenditures for capital expansion were curtailed in 1958, material handling systems should receive increased attention this year.

Leasing of Shop Trucks Will Be Popular This Year

—ROBERT H. DAVIES

• "How shall we buy?" not "Where shall we buy?" will be the question asked by many users of material handling equipment this year. There will be sharpened interest in leasing, rental, and other techniques for spreading the investment dollar. Dollars will be available for capital

LESTER M. SEARS
Chairman, Towmotor Corp.
Cleveland

FRED L. HOOPER
Executive Vice President
Cambridge Wire Cloth Co.
Cambridge, Md.

LIVINGSTON KEPLINGER
President, Steel Shipping Container
Institute, New York

WALTER A. GARRETT
Sales Manager, Strapping Div.
Brainard Steel Div., Sharon Steel
Corp., Warren, Ohio

investment, but because of the interruption in capital spending for the past year or more, modernization requirements will compete with expansion plans for each dollar available.

In the metalworking field, modernization requires heavy outlays. Leasing and rental plans will provide material handling equipment when it is most needed without the allocation of funds needed elsewhere.

Leasing will appeal mainly to the larger companies—those needing sizable quantities of handling equipment. For such firms, the biggest advantage of leasing is that it makes equipment available without excessive use of credit or large outlay of capital.

Rental plans will be more popular with smaller shops, where handling requirements vary with production and equipment is fully utilized only during peak periods. By renting fork trucks, these shops will have the equipment when it is needed but will not have the expense of long term ownership.

Continuing a trend that started last year, versatility will be a key factor in the selection of handling equipment whether it is bought, leased, or rented.

Refinements in Lift Trucks To Increase Their Scope

—LESTER M. SEARS

• Developments this year will extend the usefulness of lift trucks in all departments. Extra attention will be given advances which simplify material handling operations, and move more products through the plant, off the docks, and out of the yard. Management will also consider how lower servicing costs and reduced downtime resulting from minimum maintenance attention can contribute to profits.

We expect greater use of special load handling accessories, power steering, automatic drives, and other features that can reduce handling costs.

Our company, convinced that special features will be in demand, is introducing a number of new lift truck features, including a pedal operated power control. It enables operators to move lift trucks forward and backward more swiftly and smoothly with the left foot on a pedal. Hands are free for easy steering and faster lift operation.

It eliminates gearshift, clutch, transmission, drive line, and differential, the major causes of costly maintenance.

Conveyors for the Sixties Must Resist Heat, Chemicals

—FRED L. HOOPER

• The usefulness of woven wire belting will be increased in the sixties by metal mesh belts impregnated with high temperature silicone materials, rubber and plastic belting reinforced or cored with steel mesh, and metallic belts suited for troughing.

Cermets will open new fields for metal mesh belting for use at temperatures exceeding 2100° F. New alloys are already being field tested. Some will be offered this year.

Some plants are now planning full automation to capitalize on the demands of the sixties.

Obsolescence stands in the way of low unit costs; products must move "to, through, and from" processing equipment on conveyors which are resistant to chemicals and heat.

Lighter Gage Steel Will Be Used in Shipping Containers

—LIVINGSTON KEPLINGER

• The trend in steel shipping containers is toward lighter gages of steel (20 and lighter). Cold-rolled sheets with minimum scale and other excellent physical properties aid the surface treatment and coating of container exteriors and interiors.

Light gages also play a prominent part in the economics of container sales, where fiber, plastic, and other materials less expensive than steel are offering stiff competition, particularly for dry products.

Lighter gages permit the reduction of container selling prices and trim freight charges for the shipper.

This year will see increased use of the 20/18 gage drum (20 gage sides, 18 gage top and bottom).

In the ensuing decade, liquids and dry products will probably be carried in 24 or 24/26 gage drums.

Because of the durability and excellent quality of new steel drums, the lighter gage types are being reconditioned and re-used.

Smaller containers are already being made in the lighter gages.

Automatic Equipment To Be Used for Strapping

—WALTER A. GARRETT

• We believe that 1959 is a kickoff year for a decade of good times and progress. Prosperity means the exchange of goods, so strapping will be in great demand. In addition to the improvement of products, substantial changes in the way they are packaged for end use are due.

The greatest contribution to more efficient, less expensive handling and packaging has been the development of power tools, especially portable types.

More new and unusual tools will help reduce the time and effort involved in packaging.

Automation is making headway in the strapping industry. Automatic tools, with automatic handling equipment bringing materials to and from the strapping stations, will find increased use. Strapping

Handling and Packaging

HOWARD M. PALMER
Vice President & General Sales Mgr.
Lewis-Shepard Products Inc.
Watertown, Mass.

JOE H. PERITZ
Executive Secretary, Electric
Overhead Crane Institute Inc.
Washington

W. A. MEDDICK
President & General Manager
Elwell-Parker Electric Co.
Cleveland

R. C. SOLLENBERGER
Executive Vice President, Conveyor
Equipment Manufacturers Assn.
Washington

will continue to reduce costs and make packaged products safer to handle.

Efficiency, Economy Keynote Material Handling This Year

—HOWARD M. PALMER

• The growth of the material handling supervisor to a management level indicates recognition of handling equipment as an effective cost cutting tool.

Cost cutting and helping the businessman make more profits have always been the basic sales appeals of material handling equipment.

To satisfy the needs of an economy minded industry, the material handling manufacturer must offer:

1. A complete line of equipment, designed to cut handling costs.
2. Special attachments to make standard trucks more versatile.
3. Job engineered equipment for volume production work.
4. Trained sales engineers who know how to trim costs and apply equipment.

Those factors are a definite challenge to manufacturers of material handling equipment; they are naturally efficiency minded. They will continue to offer new products and techniques to the cost conscious buyer.

Cranemakers Look for Modest Uptrend in '59

—JOE H. PERITZ

• The anticipated need for greater industrial capacity in coming years has not been overstated.

Crane manufacturers don't feel that 1959 will be a boom year, but they do not anticipate a continuation of the present business drought. They believe 1959 will be 25 to 30 per cent ahead of 1958.

Throughout industry, increasing costs and the consequent squeeze on profits will compel the appraisal and reappraisal of procedures, processes, equipment, and facilities. The answer to the cost problem will vary in different companies and industries. In some cases, equipment can be modernized. In some cases, equipment replacement will allow fullest use of more modern tools. In other cases, completely new plants will be required.

Crane manufacturers will tailor their designs to take advantage of advances in electronics, plastics, and metallurgy that are technically and economically sound. Greater speeds, greater capacity, more automated processes, and more exact hook control will lead the way.

Industrial Truck Market Is Year Away from Boom

—W. A. MEDDICK

• Manufacturers of industrial trucks and other capital equipment can expect no more than a 15 per cent increase in business this year. Reason: The time lag between the appropriation of funds and the delivery of equipment.

Any large scale capital equipment appropriation must come from new plants or major plant additions and will not be made before the spring of 1959. Because of the engineering and production time needed for most capital equipment, there must be a delay of about 11 months from order date to delivery date.

The so-called boom in capital equipment will not come until 1960. The expected 15 per cent gain in capital equipment will come from the gradual replacement of equipment.

There will be greater demand for large capacity industrial trucks, particularly in the metalworking industry.

More companies will buy steel in coils instead of sheets to reduce scrap and shearing losses. Larger trucks (capacities of 16,000 to 20,000 lb) will be required to handle the larger loads.

Steel producers are using trucks with capacities that average 30,000 lb. Larger trucks, handling larger coils, will cut their handling costs appreciably.

Conveyor Industry Must Adapt To Changing Times

—R. C. SOLLENBERGER

• "Threshold Year," is an especially apt description for 1959. In 50 years, technology has progressed through the horse and buggy, the auto, the airplane, the radio, and television ages to the rocket age. Sober-minded engineers and businessmen are talking in terms of the science fiction writer of only a few years ago.

This year will see technological breakthroughs in almost any branch of science or engineering you can name. New industries will come into being in the next decade; old industries will die if they don't adapt to changing products and markets.

This year, a wave of technological obsolescence for machines and materials may begin. Technological obsolescence is no stranger to the conveyor manufacturer; he has seen many ingenious conveyor systems made obsolete long before their useful lives were ended simply because of a change in product, or the disappearance of a market.

There probably won't be any startling developments or new principles in conveyors, but the trend is toward greater refinement of components, more and better safety features, and more standardization of components, structures, and terminology.

Prefabricated, sectionalized construction, now found in several types of conveyors

Durable answer to you who have asked for a

husky sectional belt conveyor

ANSWERS STORAGE PROBLEM — Using Link-Belt Pre-Bilt belt conveyors to stockpile material 40 feet high, this efficient layout using a radial belt stacker has overcome the restrictions of limited area. System has to operate continuously up to 60 hours, or more.

LINK-BELT Pre-Bilt Belt conveyors handle up to 1500 tons per hour

Per pound of weight, no other sectional belt conveyor tops the strength and rigidity of Link-Belt Pre-Bilt Sectional Belt Conveyors.

For full information on these durable conveyors up to 36 in. wide—with drives up to 40 hp, 24 and 42-inch truss depths or simple channel stringer type — contact your nearby Link-Belt office.

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

14,787

From selection to erection . . . you save every step of the way with quality pre-engineered equipment

NO DETAILED DRAWINGS—From standardized data, a Link-Belt engineer will prepare an "on-the-site" quotation covering the components for your needs.

LOWER PURCHASING COSTS—Interchangeability and standardization reduce costs and speed selection of parts . . . all available from Link-Belt.

NO COSTLY DELIVERY DELAYS—PRE-BILT conveyors are built at eight strategic locations and are shipped from the plant nearest you to assure prompt delivery.

QUICK LOW-COST INSTALLATION—Simple construction and shop-assembled components facilitate field assembly and installation by your own or Link-Belt erectors.

MINIMUM OPERATING COST—These conveyors require a minimum of power for the tonnages of materials handled. Maintenance normally consists only of lubrication.

Handling and Packaging

EDWARD W. McCAUL
Vice President, Sales, Jervis B. Webb Co., Detroit

O. H. McCLEARY
President, Mathews Conveyer Co. Ellwood City, Pa.

JOHN H. MORAVA
President, United States Steel Supply Div., U. S. Steel Corp. Chicago

used for bulk and unit handling, will be used more in 1959 and in the future.

More automated systems will be built for manufacturing and distribution. Conveyors with automatic controls will lead to and from automated machines and storage areas. More effective safety devices will protect the operator, product, and machine.

Built-in inspection devices will maintain quality while work in process is on the move. Radioactive materials and the techniques of using them will make possible more accurate quality control for many kinds of products.

Long-haul transportation of materials and the short-haul of passengers by conveyors are areas likely to expand. Moving walks, operating on the level or up to 15 degrees have proved their worth in ending pedestrian congestion and eliminating physical effort.

Conveyors To Find Wider Use In Age of Automation

—EDWARD W. McCAUL

• The conveyor industry is anticipating ever broadening markets.

In the industries where conveyors have long been used, such as the automotive and household utilities fields, new areas are developing. Greater use of automatic loading and unloading is foreseen. Automatic dispatching and pushbutton warehousing will be used more in the storage and feeding of parts to assembly lines.

In industries not mechanized, methods of adapting the continuous flow principle are being studied. In the next few years conveyors will be used more in those industries, particularly in the handling of parcels, mail, freight, and baggage. They will be used most in automatic sorting and distribution of freight for the truck and express lines, in handling mail for the government, and in handling baggage for the common carriers.

Greater use of truck, train, boat, and airplane borne conveyors is being considered. Some trucks are already equipped with conveyors for special commodities. The Boeing 707 is equipped with baggage conveyors.

Light metals and high tensile steels will find greater use. The trend toward automation will promote the use of electronic and magnetic memory devices in conveyor systems.

Special Conveyor Systems To Get Greater Use in '59

—O. H. McCLEARY

• The conveyor industry should have the benefit of a favorable business climate this year. Expenditures for capital equipment, conveyor systems included, should increase in metal producing and metalworking plants.

We expect increasing demand for automatic features in conveying equipment. The great emphasis on cutting costs will certainly carry over into this period of better business. Automation, or processes approaching it, should be applied more generally.

For those companies in the business of developing and manufacturing engineered conveying systems for the metalworking industries, the trend toward automation has real significance.

There will be stronger emphasis, especially in the larger plants, on a continuous flow of materials in process. Manufacturers of engineered conveying systems will be called on to design and build equipment to handle materials in process or finished materials faster and in greater volume than ever before. As processing machines are operated faster and as they include more automatic features, there will be greater demand for special conveyor systems to handle materials in an uninterrupted flow.

The demand for engineered conveyor systems will increase with the trend toward automation.

As more modern production machinery is used in metalwoking plants, the conveying machinery which keeps it supplied become more important.

While there will be less emphasis on automation and automatic control in the smaller metalworking plants, mechanized handling will also get its share of attention there.

The smaller manufacturer also must develop a continuous flow of his products. He can no longer afford manual handling and the general confusion inherent in a nonmechanized plant.

Powered Strapping Equipment To Gain in Popularity

—JOHN H. MORAVA

• This year, more emphasis will be placed on efficiency, the development of more custom-built equipment, and improved strapping materials.

The steel strapping industry has come a long way since the days of the hand-nailed metal strip. Mechanized tensioning and sealing, then powered strapping tools, were developed to offset increased packaging costs. The last two years focused even greater attention on cost reduction.

Many powered, labor-saving machines were introduced in 1957-58. More will be developed. Demands for better manually operated equipment will increase.

Stronger and lighter strapping materials, in both round and flat forms, have reduced packaging costs considerably in recent years. More strength-weight gains are expected.

A wider variety of coating materials will offer greater protection for the strapping. It will be easier to handle and apply, and discoloration of package contents from corrosion will be eliminated.

New methods and equipment will take much of the guesswork out of strapping operations.

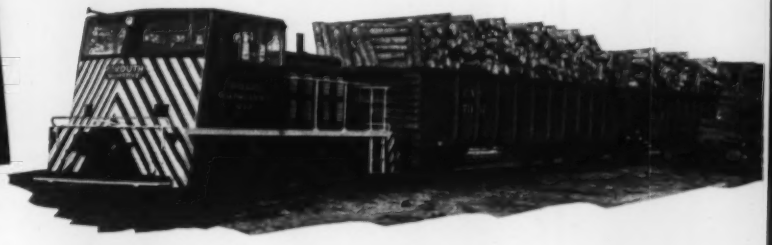
Improvements will be made on the friction or deformed type seal; joints made by those methods develop 95 to 100 per cent of the strapping material strength.

Among the new developments in strap-

PLYMOUTH® LOCOMOTIVES with Torqomotive Drive

3 TO 80 TONS

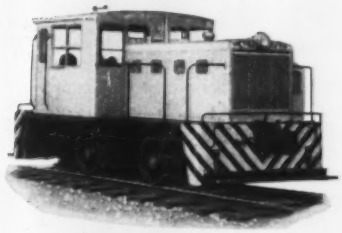
Industry's Smoothest Switchers



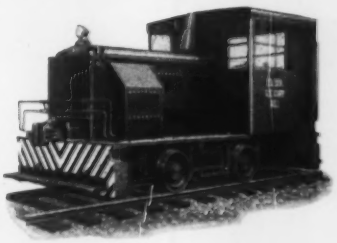
Here's the lineup of well-known Plymouth power in models from 3 to 80 tons . . . narrow or standard gauge . . . Gasoline or Diesel . . . mechanical or Torqomotive Drive . . . Diesel-Electrics. Records of users show Plymouth's economy, efficiency, dependability. Find out how these profit characteristics can improve your operation and cut costs.

PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Company
Dept. A-1, Plymouth, Ohio

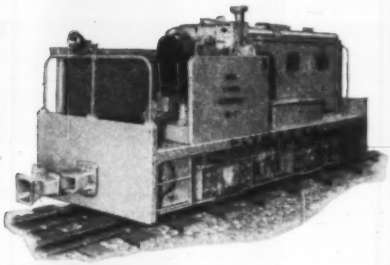
SINCE 1914 Plymouth Locomotives have been used for heavy hauling and switching jobs. They have proven themselves in year after year service with rock bottom economy, maximum availability, minimum down time. Pictured above is the new WDT Cab-in-front model, 40 tons, in service hauling pulpwood. Both the MDT and WDT are available in this model or in the standard models shown below.



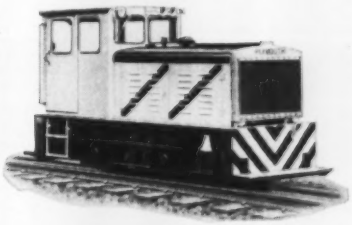
M SERIES, 25, 30, 35 or 40 tons, Diesel or gasoline, mechanical or Torqomotive Drive. This is the standard model, rear cab.



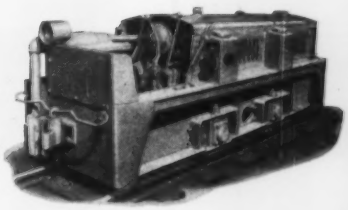
J SERIES, 12, 14, 16, 18 or 20 tons, Diesel or gasoline, mechanical or Torqomotive Drive. Available on 4 or 6 wheels.



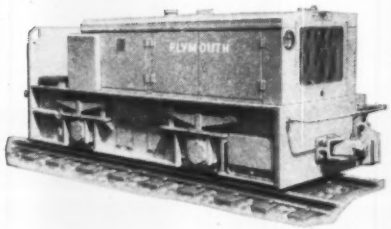
J SERIES Mine-O-Motive, 15 to 25 tons. Diesel powered with exhaust conditioner, Torqomotive Drive. Approved under Schedule #24.



D SERIES, 8, 10 or 12 tons, Diesel or gasoline, mechanical or Torqomotive Drive. Cast or Welded Frame.

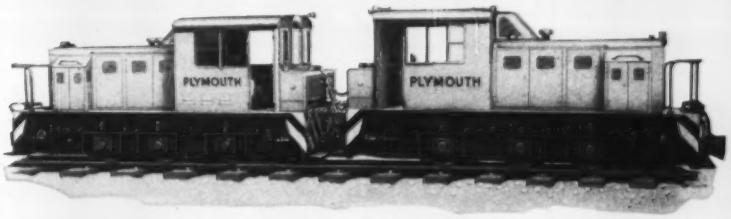


F SERIES, 5, 6, or 7 tons, available as mine type (illustrated) or cab type. Torqomotive Drive, short wheelbase.



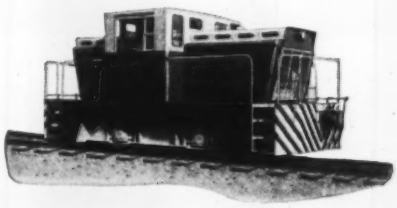
DMS SERIES Mine-O-Motive, 8, 10 or 12 tons. Diesel powered with shaft drive to both axles, full power shifting. Approved under Schedule #24.

CR SERIES, 40 to 60 tons. Diesel powered with shaft drive to both axles, full power shifting, Torqomotive Drive. Speeds to 35 MPH.



PLYMOUTH TANDEMS—M or W Series 50 to 80 tons. The M or W Series can be built for tandem, single control operation, up to 80 tons on either 8 or 12 wheels. Each locomotive can also be operated individually.

**Torqomotive Drive:* Plymouth transmission coupled to hydraulic torque-converter.



PLYMOUTH® LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS

Handling and Packaging

W. SHERIDAN HUSS
President, Acme Steel Products Div.
Acme Steel Co., Chicago

L. WEST SHEA
Managing Director, Material Handling
Institute Inc., Pittsburgh

ELMER F. TWYMAN
Vice President, Yale & Towne
Mfg. Co., New York

ping tools is an improved torque handling stretcher which permits more accurate tensioning.

More Mechanization in Packaging Expected in '59

—W. SHERIDAN HUSS

• With increased interest in cost reduction, manufacturers of machines for material handling and packaging must develop more automatic equipment.

For instance, in the steel strapping industry, the trend is toward automatic units which can be adapted and customized to any company's packaging and shipping requirements. Automatic steel strapping equipment is being developed for integration with other equipment in an efficient production line operation.

Manufacturers are adding accessory units to their standard steel strapping equipment. They are faster, easier to operate, safer to use, require less effort, and reduce fatigue.

This year, management should see more clearly the opportunities to reduce costs and increase profits through the use of specialized services in handling and packaging.

The material handling and packaging manufacturers are continually developing new methods in unitizing products for safe shipment.

Mechanization and automation are being used more in the handling of products from production line to ultimate use.

Advances are being made in the packaging, shipping, receiving, and storing of products in the lumber industry, the primary and fabricated metal industries, and in the brick, tile, and clay products industries. Those industries have become more aware of the need for cost reduction in material handling and packaging.

Better Material Handling To Cuts Costs This Year

—L. WEST SHEA

• Fully integrated material handling systems will be more widely adopted by industry in 1959 than ever before. They will have an emphatic impact on operating costs, the expediting of production, and gross profits.

In the last five years, more attention has been focused on handling. It is one of the few remaining places where costs can be cut.

Management is beginning to see that an occasional increase in material handling costs can increase production and lower over-all costs.

The purchase of new and the reassignment of older equipment reflect greater interest than ever before in equipment application.

In 1959, there will be more emphasis on mechanization and the use of the right material handling tool in the right application.

This year will see the introduction of several developments in material handling equipment to do specialized jobs.

Our segment of the metalworking industry should see an increase in business this year.

Material handling is taking a more important place in the industrial world. Many men with specialized training in material handling are in responsible positions in the metalworking industries; more than 200 people are teaching material handling courses in colleges and extension schools.

Directed education in material handling will benefit all American industry.

New Features Make Lift Trucks Special Purpose Vehicles

—ELMER F. TWYMAN

• The full impact of recovery from the recession will be felt during the first quarter of 1959 when industry will underwrite new capital expansion programs.

Planning for 1959 is decidedly bullish; there is widespread confidence that the year is the threshold of the "soaring sixties," a decade in which the most monumental expansion in our economic history is expected. Such confidence is found not only in the U. S. but also in the rest of the world.

All expansion plans include wider use of fork lift trucks as key tools, both in expanded production and distribution. For 1959, the trend will be to design and produce fork lift trucks with greater lifting and lowering speeds, greater maneuverability. Power steering and automatic transmission are being used more as standard equipment. Increased use of special attachments will transform the standard fork lift truck into a special purpose vehicle.

Development of special attachments is stimulated by new packaging methods and new shipping techniques. Also, there is a growing trend toward containerization and palletized loads.

The fork lift truck is gaining acceptance abroad as a fundamental tool for expanded industrialization. The principal deterrent to greater exports is the lack of foreign capital.

Even that obstacle is being overcome by companies realizing that the right handling equipment must be used to get the most out of rolling stock and cargo vessels.

There is growing awareness abroad that internal transport must be as efficient as high speed production equipment.

As packaging, shipping, and warehousing techniques are improved, special purpose trucks will be designed to fit new jobs. In outdoor applications, lift trucks will replace manual handling wherever possible.

High capacity, pneumatic tired vehicles will use special attachments to adapt them to logging, manufacturing, and farming.

SIMONDS ABRASIVE CO.

DIAMOND WHEELS

THE COMPLETE LINE IN EVERY RESPECT

Man-Made or Natural Diamonds

All standard shapes, sizes, diamond depths and concentrations... man-made or natural diamonds in resinoid and vitrified bond. Natural diamonds also in metal bond.

The new "man-made diamond" wheels, especially popular for grinding cemented carbides, average up to 35% more efficiency on the basis of cubic inches of carbide removed per cubic inch of wheel wear.

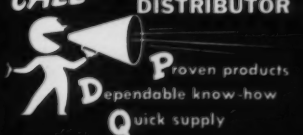
Specify "man-made diamonds" from SIMONDS . . . and get the best in diamond wheels for carbide tipped tools, chipbreakers; electrolytic grinding, surface grinding, lapping and hand honing.

INDUSTRIAL DISTRIBUTION
THE RIGHT HAND OF PRODUCTION

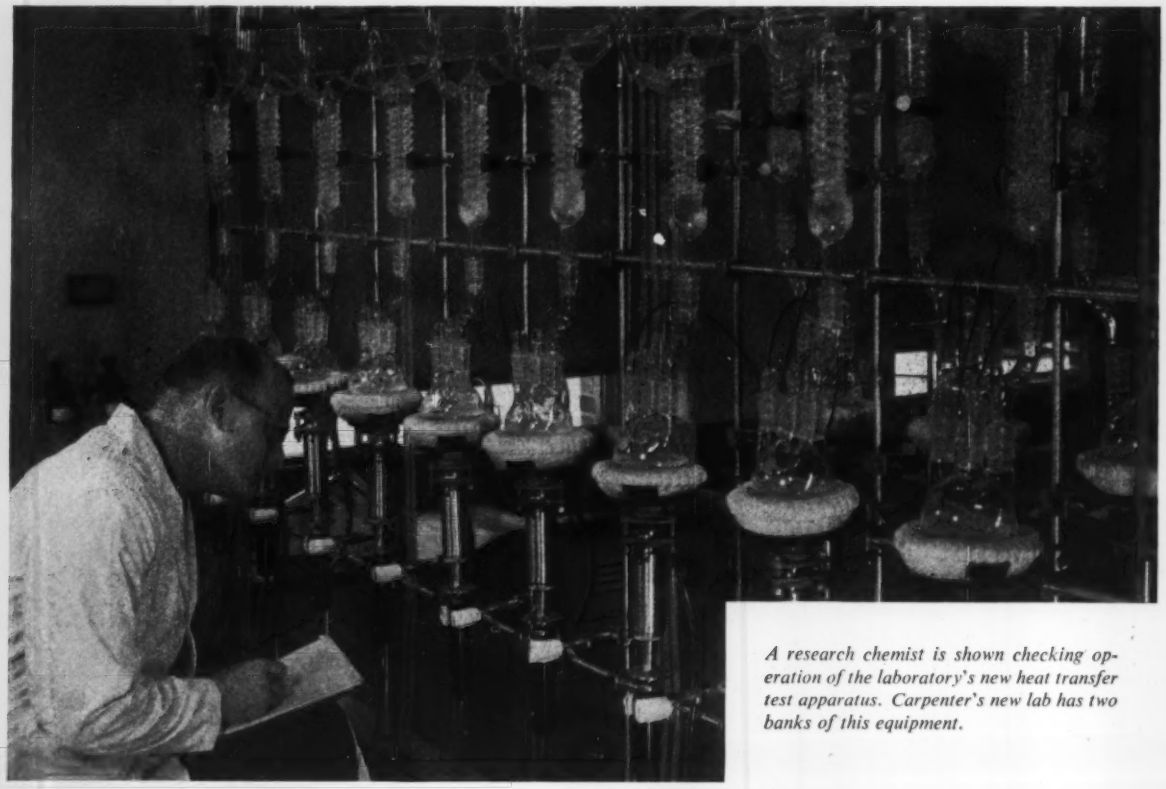
Send for illustrated catalog.

SIMONDS ABRASIVE CO.
Tacony & Fraley Sts., Philadelphia 37, Pa.
DIVISION OF SIMONDS SAW AND STEEL CO.
BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA
PORTLAND, ORE. • SAN FRANCISCO • SHREVEPORT

CALL YOUR SIMONDS DISTRIBUTOR



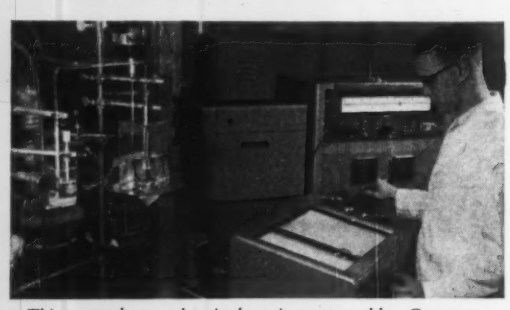
P roven products
D ependable know-how
Q uick supply



A research chemist is shown checking operation of the laboratory's new heat transfer test apparatus. Carpenter's new lab has two banks of this equipment.

Carpenter's new corrosion laboratory can predict stainless tubing performance on your job

A corrosion engineer makes final adjustments on the new Corrosometer.



This new electro-chemical equipment enables Carpenter to make more thorough study of the behavior of stainless steels and thus gather more background for the development of new and improved alloys.

This new laboratory is considered the largest and best equipped of its kind among companies producing specialty steel exclusively. Heat transfer apparatus, Corrosometer, multi-sample tester, electro-chemical equipment, high pressure, elevated temperature corrosion testing, and stress corrosion cracking equipment give Carpenter the facilities to help solve your corrosion problems and select the right material for any of your needs. Carpenter . . . first in corrosion research . . . first in corrosion control . . . first in stainless tubing and pipe economy. Authorized distributors in over 40 cities, coast to coast. Or write to The Carpenter Steel Company, Alloy Tube Division, Union, N.J.

your master key to cost-saving corrosion control

Stainless Tubing & Pipe

KERRY L. BERKEY
Senior Project Engineer
Wright Air Development Center
Wright-Patterson Air Force Base
Dayton, Ohio

W. J. BROWN
Staff Production Applications Engineer, Gulf Research & Development Co., Gulf Oil Corp.
Pittsburgh

ALEX P. FOX
Vice President
Lincoln Engineering Co.
St. Louis

E. L. H. BASTIAN
Senior Engineer, Manufacturing
Shell Oil Co.
New York

1959 FORUM ON TECHNICAL PROGRESS

Lubrication

High Temperature Lubricants Needed for Aircraft Engines

—KERRY L. BERKEY

• Aircraft engines will operate at still higher temperatures because of higher flight speeds and greater heat rejection rates.

Use of air as a heat sink for oil cooling is no longer practicable because of the high temperature of ram air at high flight speeds.

Lubricants and engine parts, such as gears, bearings, and pumps must be operated at ever higher temperatures. High temperature gear materials and lubricants will be needed to retard wear and extend operating life.

In gas turbines, gear loads will not increase drastically, but the operating temperatures of gears and lubricants will be higher. A 35 per cent increase is expected in the near future, possibly 100 to 200 per cent in the next few years.

Use of Soluble Roll Coolants In Cold Rolling To Increase

—W. J. BROWN

• Soluble oils for cold rolling ferrous and nonferrous metals will meet wide acceptance in 1959. Water soluble compounds, with their excellent cleaning, wetting, and burn-off characteristics, will permit higher mill speeds and lower rolling temperatures. They also provide good rust protection and closer tolerances.

When strip is cold rolled with soluble oil, it does not require cleaning before it is annealed.

Improved soluble and mineral rolling oils will be offered for aluminum, titanium, and other metals, permitting higher rolling speeds and providing better reduction.

In the development of new lubricants and coolants, attention will be given to the role of oils in producing better rolled finishes. Water marking, heretofore an objectionable feature of soluble oils, will be eliminated; more effective rust preventives will be offered for steel and its alloys.

Centralized Lubrication To See Greater Use in '59

—ALEX P. FOX

• Improved lubrication methods will increase machine performance qualitatively and quantitatively this year.

Plant managers are trying harder than ever before to reduce operating costs. Taking a long, hard look at growing investments in production facilities, they are insisting on more effective methods for increasing dividends. In looking for ways to cut costs and increase production, they have discovered a gold mine in the modern, centralized, power lubrication system.

For many years, manual lubrication was adequate because bearings weren't the jewellike assemblies they are today, and machinery didn't move rapidly. Casual, even careless lubrication was often good enough. But failure to give modern, high speed bearings and machines their exact lubrication needs is the same as committing sabotage.

Centralized lubrication systems will insure longer machine service life. They will eliminate the human element, positively protect against breakdowns caused by inadequate lubrication, and reduce over-all maintenance costs.

They will expand the sales appeal of new equipment, and provide long, uninterrupted service life with a minimum expenditure for lubrication maintenance and part replacement.

Modern Metals Will Require Improved Lubrication Methods

—E. L. H. BASTIAN

• There must be continued improvement of lubricants for new or conventional metal fabrication methods.

Alloys being used in the aircraft and missile fields are refractory and often

Lubrication

H. A. HARTUNG
Research & Development Dept.
Applications Research Div.
Atlantic Refining Co.
Philadelphia

BRUCE M. DUNHAM
Technical Consultant
Sun Oil Co.
Philadelphia

J. M. DAVIDSON
Sales Manager
Metal Processing Dept.
Pennsalt Chemicals Corp.
Philadelphia

R. Q. SHARPE
Chief Engineer
Industrial Div.
Socony Mobil Oil Co.
New York

reactive. Including such elements as titanium, tantalum, and molybdenum, they are designed for operation at temperatures up to 2000° F.

With new extrusion processes derived from older spinning methods, surface reactive metals will be fabricated without the metal-gas reactions found in hot working because the metals are worked below their recrystallization temperatures.

There will be continued use of the three general types of metalworking lubricants—emulsions, mineral oils, and solids.

Water base lubricants, used primarily as coolants, consist of solution and dispersion fluids. The oil-type fluids, including several extreme pressure and friction reducing compounds, are used in the newer forming, drawing, and extrusion processes.

Solid lubricants, including certain metals, graphite materials, and soaps, will gain popularity in metalworking. They will be used more where high surface adherence and high spot temperatures are encountered.

Reactive metals are often clad with another metal, such as copper or aluminum, before extrusion. The cladding can be retained during secondary working. The soft copper or aluminum sheath serves as a solid lubricant and as a substrate for application of fluid lubricants.

High Temperature Lubricants Will Gain This Year

—H. A. HARTUNG

• Designers, builders, and operators of industrial equipment are becoming more aware of the need for high quality lubricants.

Modern equipment in the metalworking industry is capable of high speed production; metalworking lubricants and rust preventives are receiving more attention. Increased emphasis on lubrication and the growing demand for higher quality products will stimulate suppliers to produce better lubricants.

In many new machines, higher operating temperatures and pressures are being encountered. Those developments will make necessary industrial lubricants with excellent stability and lubricating properties.

In some cases fire-resistant lubricants will be required; they will gain popularity in the coming year and the decade to follow.

Trend Favors Fire Resistant, Heat Resistant Lubricants

—BRUCE M. DUNHAM

• This year, more attention will be directed toward fire-resistant fluids in industrial plants. Fire-resistant fluids will be used more in hydraulic systems of mining equipment. Water-in-oil emulsions will be widely adopted because of their low initial cost.

The wide variety of lubricating oils now available will be satisfactory for general industrial use. Industry is not demanding many new functions in lubricants to accommodate present or near future machine designs.

Newer metal processing equipment will continue to use less grease per ton produced. Demand for greater production will spur development of better heat resistant greases. Another trend will be the increased use of heat resistant, water resistant, "extreme pressure" greases.

No revolutionary thickener or gelling agents appear on the horizon. Calcium, sodium, lithium, and calcium-complex type thickeners, along with present inert gelling agents, will be most popular.

Improvement in petroleum base rolling oils for carbon steels, stainless steels, aluminum, and brass may be expected in 1959; they are expected to produce cleaner metal with brighter finishes.

Wire To Be Phosphatized In Continuous Process

—J. M. DAVIDSON

• For some time, the wire industry has been interested in a process for the continuous phosphatizing of wire prior to drawing or forming. It is adaptable to automation. At present, batches of wire are phosphatized in coils for about 5 minutes. Continuous application requires less space, less handling equipment, and less labor. It also improves uniformity of coatings. Scalefree wire may be phosphatized in from 1 to 5 seconds by a special, two stage chemical process.

In 1959, the process should be accepted on a production basis. Test runs were made on low carbon 0.25 in. wire that was descaled mechanically prior to the phosphatizing process. A soap type lubricant was picked up by the wire as it went through the first or ripper die.

The process will save time, cost less, and produce a more standard product than previous methods.

Lubricants Will Keep Up With Changing Technology

—R. Q. SHARPE

• In looking to 1959 as a "threshold year," the designers of metalworking and metal processing equipment can be sure that improved lubricants will be available to meet their needs in new applications.

New technological developments will

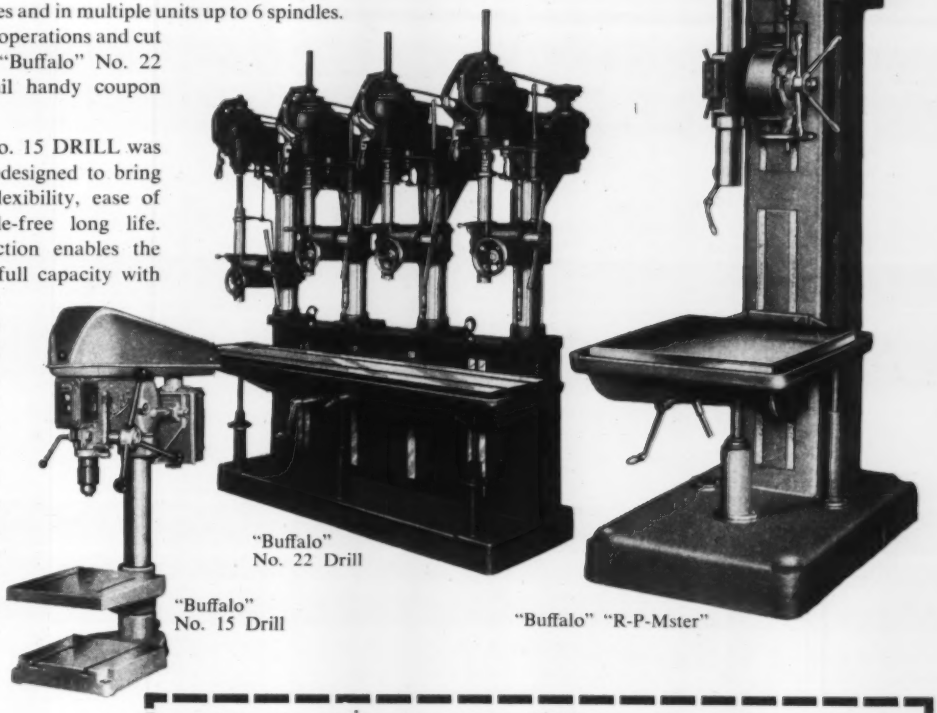
FOR LONGER LIFE— BETTER PERFORMANCE GET "BUFFALO" QUALITY DRILLING MACHINES

THE "BUFFALO" No. 22 DRILL is designed for rapid, precise sequence drilling and tapping up to 1¼" in mild steel. The No. 22 has an abundance of smooth power, plus complete rigidity for accuracy and long, maintenance-free life. Adjustments and operation are as easy as with lighter, sensitive drills. As in all "Buffalo" Drills, the precision ball bearing spindle assures the utmost dependability. Available in floor or pedestal types and in multiple units up to 6 spindles. To speed your drilling operations and cut costs, investigate the "Buffalo" No. 22 Drill. Check and mail handy coupon below.

THE "BUFFALO" No. 15 DRILL was recently completely redesigned to bring you a new high in flexibility, ease of operation and trouble-free long life. Rigid, heavy construction enables the No. 15 to operate at full capacity with no undue strain or wear. Yet extreme sensitivity is provided for small hole drilling. Fill your needs from floor, bench and pedestal types—the two latter in 1 to 6 spindle models. See how the "Buffalo" No. 15 Drill can economically increase your production output. Mail coupon below for full information.

THE "BUFFALO" "R-P-Mster" is the famous variable speed drill which has attained new heights of drilling ease and smoothness. Newly re-designed for greater capacities, the No. 1A is rated at 1" in mild steel, the No. 2A is rated at 1½" in mild steel and the No. 3A at 2". Easily-reached controls vary the spindle speed infinitely within a wide range. Available in pedestal models (1 to 6 spindles), the "Buffalo" "R-P-Mster" features extreme accuracy and long life. For complete facts, use coupon below.

All "Buffalo" products bring you the "Q" Factor — the built-in QUALITY which provides trouble-free satisfaction and long life.



"Buffalo" No. 22 Drill

"Buffalo" No. 15 Drill

"Buffalo" "R-P-Mster"

"Buffalo"

DRILLING
PUNCHING
SHEARING
BENDING

BUFFALO FORGE COMPANY

158 Mortimer Street, Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Please send me additional information on the following "Buffalo" Drilling Machines:

☐ No. 22 ☐ "R-P-Mster" ☐ No. 15

NAME _____

FIRM _____ TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

influence the design of equipment and the lubricants to protect it. Nuclear power will be used more for stationary, marine, and perhaps mobile service. Oils and greases must be relatively unaffected by exposure to radiation. They must retain desirable lubricating properties under severe conditions.

Free piston engines and gas turbines will be used more for power generation. Both will present critical lubrication problems.

In the development of lubricants and metal processing oils, there will be increased use of radioactive techniques in wear measurement. They will offer excellent and reproducible data in minutes or hours, compared with the weeks or months required by other testing procedures.

Modifications in gear design, providing increasing pressure angles and heavier unit loadings, will require improved lubricants. Lubricants are being developed for more effective run-in of new gear sets in large marine and stationary installations.

Synthetics will be used more for fire resistant hydraulic and lubrication service. They will also find increased use where high temperatures and nuclear radiation are encountered.

Solid Films Lubricate At High Temperatures

—RALPH E. CRUMP

• The solid film lubricant industry offers the only products available for temperatures above 600° F. It is using the latest resins and ceramics, synthesizing new solid lubricant pigments, and developing new metal pretreatments to improve adhesion.

In the next few years, solid film lubricants will be beneficial in several areas, including cryogenics, high vacuum technology, and high temperature metalworking.

New rocket, jet engine, and missile designs call for something better than conventional solid film lubricants: Thermosetting resins, usually binding molybdenum disulfide and graphite. There have been demands for increased corrosion resistance in the presence of corrosive substances other than water and performance at extremely low temperatures (−300° F) or extremely high temperatures (1500° F). Positive lubrication is required in ultrahigh vacuums—satellite chambers operating at an altitude of 500 miles where conventional resin bond solid film lubricants would sublime at a prohibitive rate.

The solid film lubricant industry has responded with new corrosion resistant lubricating films; some are good enough to replace cadmium plating. High temperature requirements are met by ceramic bonded solid lubricants, such as synthetic graphite, lead oxide, tungsten disulphide, boron nitride, and other materials unheard of beyond the laboratory two years ago.

Some interesting developments: A high altitude, high vacuum lubricant, in which a ceramic binder replaced the conventional resin binder—molybdenum disulfide was used as the solid lubricant; an abrasion resistant, rubber bonded solid lubricant film for applications where rubber is in contact with metal or other surfaces; and solid film lubricants with known, controlled electrical conductivity properties.

High Temperature Lubricants, Scale Preventives Needed

—ARTHUR J. STOCK

• In the production of missiles and other new metal products, there is a critical need for metals and superalloys with good high temperature properties. This year we must have materials that can stand temperatures not dreamed of five years ago.

Lubricants used in forming the newer alloys continue to be a problem. Graphite has been used for some time as a heat resistant lubricant, but now there is a need for coatings that will prevent oxidation and scale development in the metal being worked. The use of inert atmospheres is a relatively difficult and expensive way to prevent scale development, but it will be used more in the future.

Glass dispersions will be applied to metals before they are soaked, so that scale will not interfere with forming. Aqueous graphite die coatings will be used with the glass materials to furnish lubrication and prevent oxidation.

Boron nitride, tungsten disulfide, and other lubricating solids relatively unknown now will be used more at higher drawing, forging, and extruding temperatures.

Improved Tool Lubricants Must Be Developed in '59

—JOHN A. BOYD

• New alloys and more demanding uses of older ones will start a new development cycle in tool lubrication this year. Engineering changes in missile, satellite, automotive, and allied fields will bring out new metal uses and make sharp changes in tool lubricants.

In the aircraft field, new high strength, thermal resistant alloys will present difficult machining and finishing problems. Standard sulfurized cutting oils will be replaced by modern chemical lubricants that provide better cooling for the tools and better extreme pressure lubrication. With the newer lubricants, the newer alloys can be handled at economical production speeds.

In the automotive field, planned changes in metals will change tool lubricant requirements. Semisynthetic, water soluble compounds will be used more because of their better cleaning and lubricating properties.

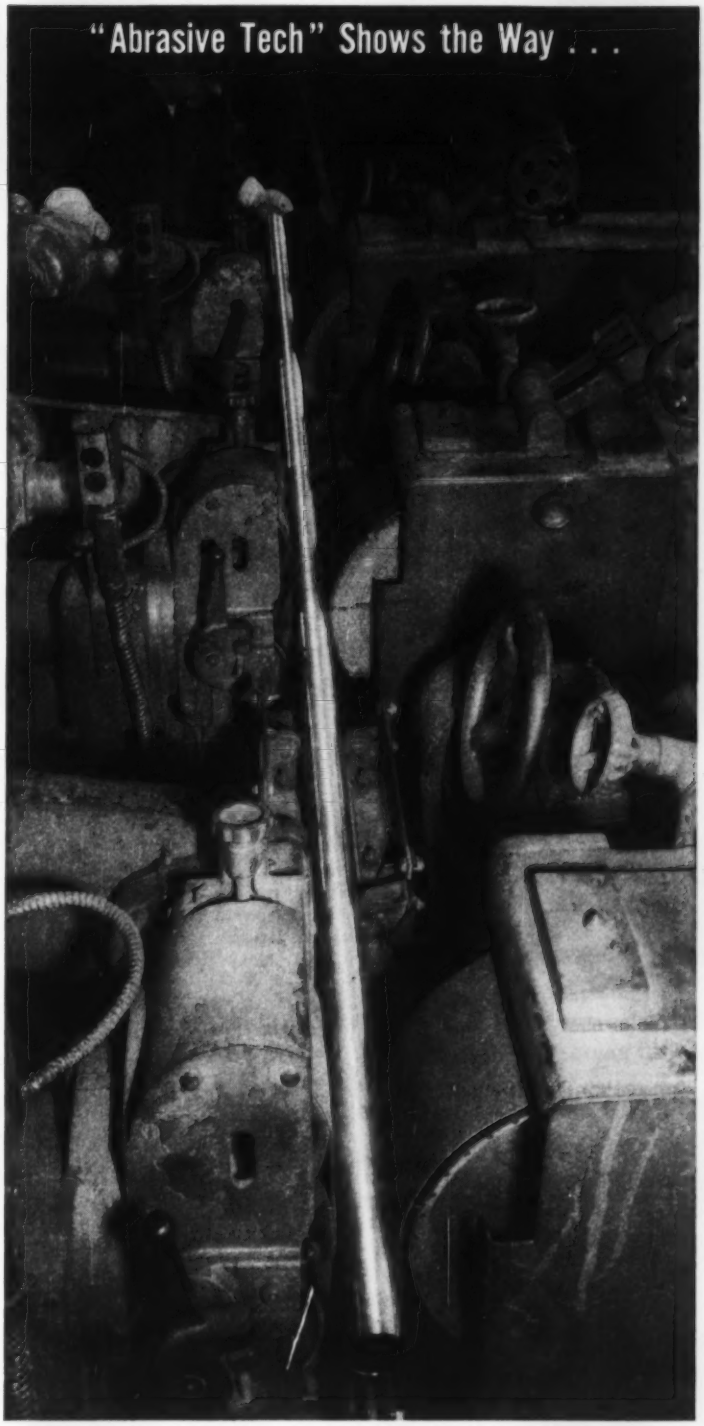
Emphasis on reduced machining costs will continue; increased machining speeds will further encourage the shift from straight oils to water soluble cutting compounds. Heavy duty, extreme pressure solubles will make it possible to increase

Lubrication

RALPH E. CRUMP
Chief Engineer
Electrofilm Inc.
North Hollywood, Calif.

ARTHUR J. STOCK
Manager, Research & Development
Acheson Colloids Co.
Port Huron, Mich.

JOHN A. BOYD
Vice President
Van Straaten Chemical Co.
Chicago



Faster polishing of steel tubing—

By using RESINALL METALITE cloth belts in a sequence of grits on a 3-head centerless grinder, stainless steel tubing is polished in a *single* pass.

An "Abrasive Tech" method like this may speed your production, save you time and money. If you have a production or cost problem, Behr-Manning "Abrasive Tech" engineers may have the answer. Ask for a demonstration on your toughest job in your own plant, at our main Engineering Laboratories, or at any of the 17 well-equipped "Abrasive Tech" Methods Rooms throughout the country.

For name of Behr-Manning representative nearest you, write Dept. S-1.

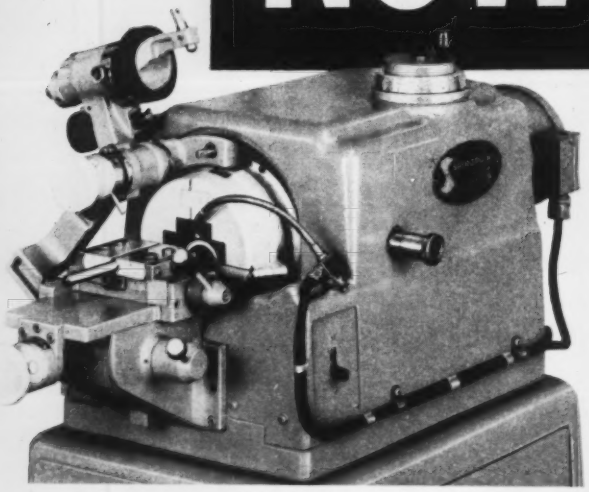
BEHR-MANNING CO.
TROY, NEW YORK
A DIVISION OF NORTON COMPANY NORTON ABRASIVES®

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
In Canada: Behr-Manning (Canada) Ltd., Brantford. For Export: Norton Behr-Manning Overseas Inc., Troy, N. Y., U.S.A.

IA-1

REDUCE DRILLING COSTS... INCREASE HOLE ACCURACIES

RIGHT NOW!



. . . with your own standard twist drills sharpened to SPIRAL POINT—Cincinnati's new drill point geometry.

Now, drill PRECISION holes with Spiral Point—**all the way up to 1" diameter.**

Get accurate hole size . . . straighter, rounder, cleaner holes . . . and you eliminate secondary operations. Maintain hole-positioning accuracy without costly guide bushings or pre-centering. Get more holes per grind.

CONVERT

the twist drills in your plant to *precision Spiral Points* with Cincinnati's SPIROPOINT® DRILL SHARPENER. It automatically applies this cost-saving geometry in a matter of seconds.

IMMEDIATE DELIVERY on sizes to 1"

Improved Machining Through Research

CINCINNATI LATHE AND TOOL CO.

3210 Disney Street • Cincinnati 9, Ohio

"TRAY-TOP" Lathes • "CINCINNATI" Drilling Machines
"SPIROPOINT" Drill Sharpener

Lubrication

CHARLES E. REED
General Manager
Silicone Products Dept.
Chemical & Metallurgical Div.
General Electric Co.
Waterford, N. Y.

speeds and maintain economical tool life. Long lasting, bacteriafree soluble compounds will find increased use.

Silicone Lubricants To Gain In High Temperature Uses

—CHARLES E. REED

• Improved silicone lubricants will rapidly take their place with other silicone products important in the metalworking industry.

Because of their relatively poor lubricity, silicones have seen little use except where temperature extremes caused other lubricants to fail.

New silicone lubricants will support loads under sliding, rolling, or hydrodynamic conditions, even at extreme temperatures.

Called Versilubes, they are chemically inert and have extremely high boiling points. Evaporation losses are less than those of any other lubricant. The fluids present no unusual handling problems because they are stable in storage and nonreactive with water.

Among lubricating fluids, they are unmatched in temperature-viscosity characteristics. They pour below −100° F and are pumpable below −65° F. They can be pumped easily at 700° F.

The fluids will meet the needs of the metalworking industry for better high temperature lubricants and hydraulic fluids. They are excellent for such applications as the extrusion, bending, shaping, and high speed drilling of aluminum.

Silicone greases will also offer good lubricity and high temperature stability. Long life at elevated temperatures will reduce the maintenance required on much of the equipment used in the metalworking industry. Bearings in motors, conveyors, rolls, cranes, fans, and other equipment used in high temperature areas will last longer—and they won't have to be lubricated so often.

STAINLESS STEEL PIPE & TUBING

Prevents Corrosion Here...

Insures Product Purity Here

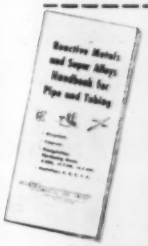
Stainless can eliminate unwanted product contamination and discoloration in process or service lines. Impervious to attack from most commercial reagents, it provides lasting freedom from costly corrosion.

Damascus manufactures a complete line of stainless pipe and tubing in sizes from ½" to 3" O.D. Available in standard A.I.S.I. analyses for normal applications and special metals for extreme corrosive service.

For assistance in selecting the right material for your job, contact Damascus direct—or call your nearest Steel Service Center.

COMPLETE INFORMATION ON RARE AND REACTIVE METALS PIPE AND TUBING

New 44-page handbook contains data on applications, heat treatment, corrosion resistance, chemical and physical analysis, mechanical properties of Zirconium, Zircaloy 2, Zircaloy 3; Titanium, grades 40, 55, and 70; Precipitation Hardening Steels, A-286, 17-7-PH, 15-7-MO; HASTELLOY ALLOYS, A, B, C, F, and X.



DAMASCUS TUBE COMPANY
Greenville, Pa.

Gentlemen: Please send me your new 44-page handbook.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

DAMASCUS TUBE COMPANY

STAINLESS STEEL TUBING AND PIPE

GREENVILLE, PENNSYLVANIA

POWER STEELTUBE INSTITUTE

AMERICAN STEEL WAREHOUSE ASS'N

HERESITE

REG. U. S. PAT. OFFICE

Serving the many industries using steel, the HERESITE pure phenol-formaldehyde coatings, introduced in 1935, have in 24 years become internationally known and up to now maintain their leading role as a protection of steel products against corrosion.

Steel container manufacturers and finishers have found there is no comparable product at this time to protect materials from contamination during transit.

HERESITE coatings are non-toxic, odorless, tasteless, unaffected by most acids or alkalies and insoluble in all known solvents.

APPLICATION METHODS:

Cold spray, hot spray, and roller coating.

HERESITE IS PROVEN PROTECTION

TANK CARS & TRAILERS
CHEMICAL PLANTS
PIPELINES
DIESEL ENGINE PARTS
FUME HOODS & DUCTS
FANS & BLOWERS
SHIPPING CONTAINERS
WATERCONDITIONING SYSTEMS
BREWING INDUSTRY
PACKING HOUSE EQUIPMENT
RUBBER LATEX
HEATING & AIR CONDITIONING

AVOID PRODUCTS CONTAMINATION — — CONTROL COSTLY CORROSION

Catalog No. 57 will be mailed if requested on your letterhead.

HERESITE & CHEMICAL COMPANY

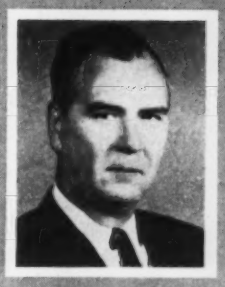
MAIN OFFICE & PLANT—MANITOWOC, WISCONSIN

EASTERN DIVISION—GARWOOD, NEW JERSEY

Canada: Dominion Rubber Company, Ltd.
Montreal, Quebec

Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland

E. A. CARSEY
Assistant Chief Engineer
Kirk & Blum Mfg. Co.
Cincinnati



WALTER L. DAVIDSON
Manager, General Sales Dept.
Engineering Works Div.
Dravo Corp.,
Pittsburgh

N. T. SHIDELER
Manager, Protective Coatings Research
Pittsburgh Coke & Chemical Co.
Pittsburgh

C. H. GALLAWAY
Vice President
Safety Products Div.
American Optical Co.
Southbridge, Mass.

FORUM ON TECHNICAL PROGRESS

Service and Maintenance

Predicts Big Advances In Dust, Fume Collection

—E. A. CARSEY

• Industrial dust and fume control systems will play an important role in our industrial lives in 1959. The systems are highly specialized; each application must be engineered to satisfy a specific requirement.

Special coatings will be used more extensively in dust and fume control equipment to protect against abrasion, corrosion, oxidation, and erosion.

Filter and fan designs have been improved. Centrifugal collectors, water spray collectors, cloth and fabric filters, and electrostatic collectors are standard in the industry and will be widely used.

Space Heating Will Get Warm Welcome Even in Mild Areas

—WALTER L. DAVIDSON

• Warm air space heating will find greater acceptance in all parts of the country this year, especially where ventilating, air tempering, or process drying are as important as employee comfort.

For years, the systems have been used to supply warmed air to working areas of large hard-to-heat industrial buildings, warehouses, and commercial structures in the North Central and New England States. They are now finding ready markets in the South, Southwest, and West Coast.

Design changes have led to more efficient combustion and air handling functions. Extreme flexibility in the matching of fan requirements with heater output capacities permits heating engineers to customize heaters for every installation, regardless of geographic location.

Better Pipeline Protection Expected from New Coatings

—N. T. SHIDELER

• In the next two or three years, more will be known about the effect of bacteria on coatings. The definition of the ideal coating system for protection of underground transportation lines may be changed radically.

The study of bacteria may explain why some coating systems fail. It may redirect the approach to coatings for the protection of underground pipelines.

Soil bacteria may do more than cause corrosion of bare steel; there is evidence that bacteria feed on some of the protective coatings, destroying the protective film.

Each year, tons of steel go into underground piping, such as the crosscountry oil and gas transportation lines. For more than 50 years, the most popular coatings used to protect underground piping have been the hot applied coal tar enamels and, to a limited extent, the hot applied asphalt coatings.

Since 1945, the building of oil and gas transportation lines has accelerated. There has been increased effort to produce a coating that can be applied without heat. New materials, like vinyl and polyethylene tape, have been placed on the market, and considerable interest has been shown in catalytic setting, coal tar-epoxy resin coatings. They are not in general use, but industry is looking in their direction for improvement and simplification of pipeline coatings.

Improved Safety Equipment Needed To Reduce Hazards

—C. H. GALLAWAY

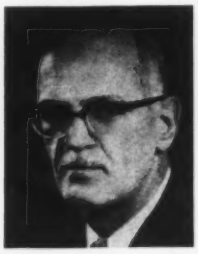
• The future holds many interesting challenges for us. We are faced with hazards resulting from scientific progress, such as those encountered at extreme altitudes or in outer space. A major problem is the utilization of new materials, primarily metals, that may have to withstand extreme temperatures, have superior strength, and be corrosion resistant. New materials will mean new production methods and

Service and Maintenance

JAMES D. WILCOCK
Manager of Marketing
Sturtevant Div.
Westinghouse Electric Corp.
Boston

J. T. RYAN JR.
President
Mine Safety Appliance Co.
Pittsburgh

R. T. PRING
Technical Director
Dust & Fume Control Div.
Wheelabrator Corp.
Mishawaka, Ind.



EVERETT P. PARTRIDGE
Director, Hall Laboratories Div.
Hagan Chemicals & Controls Inc.
Pittsburgh

new hazards to personnel. The hazards must be overcome by new or modified safety devices.

Jet aircraft and missiles have created a severe noise problem. Our company sells a good noise protector but is constantly striving to improve it by better design and by the use of new materials.

Plastics and lightweight metals continue to play a leading role in new product development. We are experimenting constantly with those materials, to offer industry a safer, more durable product.

One of the products resulting from our development program is a respirator used by workers in areas where heat (up to 300° F) harms the respiratory system and limits worker productivity. The respirator, used to cool air to respirable temperatures, is made of plastic and aluminum. It is practically weightless but durable.

Progress in Air Conditioning Seen for Next Ten Years

—JAMES W. WILCOCK

• In the next decade, many advances will be made in the design and application of ventilating and air cleaning equipment.

Today's research effort is tomorrow's product. The search for new alloys, better welding methods, complete resistance to erosion and corrosion, high temperature materials, more efficient heat transfer, and better controls will result in new and better air handling products.

There will be more air conditioning and high-efficiency air cleaning in industrial plants. With effective control of temperature and the contaminants in the air, savings can be made in manufacturing efficiency, plant maintenance, and worker well-being.

Research will help the designer decrease the size of his product, saving valuable space and reducing the cost of related equipment, such as ductwork. Research in noise abatement will promote the manufacture of quieter equipment.

Safety Equipment Keeps Pace With Metalworking Progress

—J. T. RYAN JR.

• Rapid progress in the production of quality steels will place increased demands on the makers of safety equipment this year. They must develop new equipment to meet special problems that accompany technical progress in metalworking.

Safety is never off the drawing boards. Safety engineers keep up with new processing techniques; they are constantly engaged in research and development, so that safety devices can be available when new hazards appear.

More automatic instruments will be offered because of the trend toward automation and more effective quality control in making special alloys.

Progress in safety equipment is not confined to automation processes. Other equipment must be kept up to date. Examples: Gas masks, safety helmets, and portable instruments for checking potentially dangerous gas concentrations.

Improved Methods Considered For Air and Gas Cleaning

—R. T. PRING

• Research will continue in 1959 on equipment for cleaning open hearth furnace gases, particularly on high efficiency scrubbers, continuous slag wool filters, and conventional baghouses employing various filter media. Until a less expensive process can be developed, electrostatic precipitators will be used for cleaning open hearth gases.

Most cloth baghouses used for the control of electric steel melting furnace fumes employ Orlon filter bags. When used with a properly installed roof-mounted exhaust hood, they show satisfactory resistance to heat and chemicals.

Glass bags have been considered for fume collection from larger melting furnaces. They are no panacea in cleaning arc furnace gases, but in some cases higher operating costs are justified (use of glass at temperatures up to 500° F eliminates the need for gas cooling).

Direct shell tap ventilation is now used in the manufacture of open hearth grade steel. The process is being considered for furnaces melting stainless and high alloy steel.

Interest is being shown in equipment to clean air for rolling mill motorrooms, electrical equipment, and turboblower intakes. Maintenance costs of such equipment are being studied.

Solution to Water Problems Seen in New Coagulant Aids

—EVERETT P. PARTRIDGE

• New coagulant aids promise better water clarification for the steel industry. Iron and aluminum salts alone are no longer effective enough to meet higher standards for treatment—whether the water is re-used or merely disposed of.

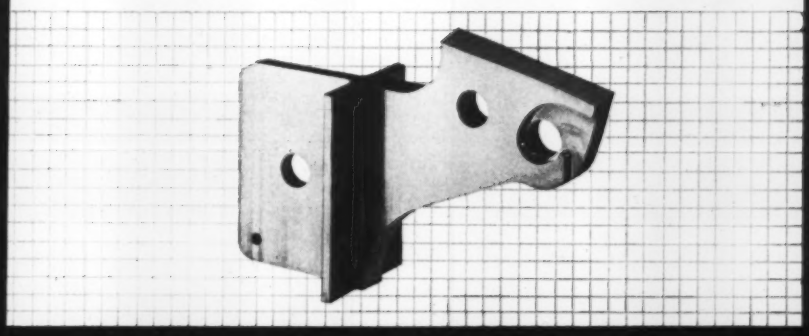
Coagulant aids are often mentioned when operators talk about mill waste; solid particles suspended in water pose big problems. Water used in the steel industry for quenching and descaling may require removal of silt or waste products from upstream plants.

Clarification of water after use in many processes is a must for protection

CTRONIC NTROL STEMS

LEADERS IN NUMERICAL CONTROL

S-C
STROMBERG-CARLSON



high performance at low price

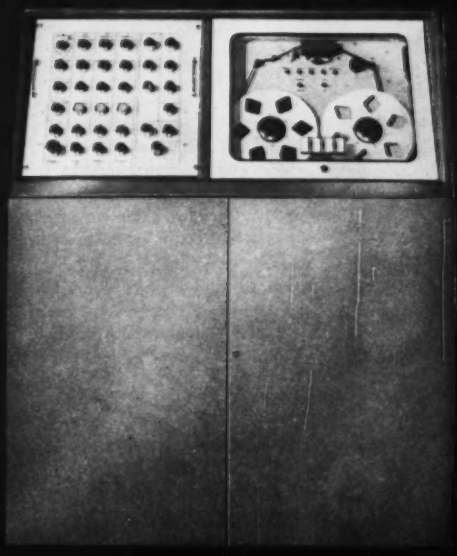
DIGIMATIC* 180

CONTOURING CONTROL SYSTEM

Lowest priced high performance control now being marketed for heavy duty machine tools. Compact, efficient design. Reliable, easily maintained construction. Simple to learn and operate. Fifteen Model 180 control systems, combined with contour milling machines, are being delivered to Air Force contractors to provide shorter lead times, new design freedom and faster, lower cost production.

Handles any size boring mill, profiler, vertical turret lathe, bed-type milling machine or lathe. Gives three-axis coordinated control with up to 180 inches per minute cutting rate. Designed for ±0.001-inch control accuracy; officially tested at ±0.00025-inches. All around finest machine tool control system available today.

Write for 12-page "Model 180 Control System" Catalog.



ELECTRONIC CONTROL SYSTEMS
Division of
STROMBERG-CARLSON
DIVISION OF GENERAL DYNAMICS CORPORATION
2231 S. Barrington Avenue · Los Angeles 64, California

*DIGIMATIC is our trademark

Service and Maintenance

HENRY E. JENSEN
Vice President
C & D Batteries Inc.
Conshohocken, Pa.

A. R. CORLETT
Executive Vice President
Harco Corp.
Cleveland

W. O. VEDDER
Vice President
Pangborn Corp.
Hagerstown, Md.

ORVILLE C. HOGNANDER
Vice President
C. H. Tennant Co.
Minneapolis

of other equipment. (Example: Protection must be given the demineralizers that prepare rinse water for electrolytic tin coating processes.)

Water flowing from mills must be relieved of suspended solids. Washing of flue gas or coal loads water with sediment that is often worth recovering. Coagulant aids can help recover ore from flue gas wash waters and, at the same time, assure compliance with anti-pollution laws.

Miniaturization in Batteries on Way To Meet Small Truck Needs

—HENRY E. JENSEN

• Among manufacturers of industrial storage batteries, development activity is expected to continue at an ever-increasing pace this year.

New types and sizes of batteries will be produced to meet growing demands of the electric truck industry. Typical of this is the decreasing size of electric trucks, which conserves aisle space. Storage battery manufacturers must produce smaller batteries with greater output.

Rubber covers and containers introduced two years ago have been improved and are now over 15 times more resistant to shock than containers previously used.

Until recently, standard lead-acid batteries, maintained in a charged condition by conventional trickle charge, have been used for tripping circuit breakers and starting stationary engines. A lead-acid battery with lead-calcium grids used with a constant voltage, current limiting, automatic silicon charger, has improved reliability and lengthened the life of such equipment. Annual water addition to the battery is the only maintenance required.

The battery was originally developed for power and communications, but is spreading to other fields. Newest of these is the starting of railroad diesel locomotives.

Cathodic Protection To Grow in Next Decade

—A. R. CORLETT

• Cathodic protection, an electrical means of preventing corrosion of buried or submerged structures, is in a period of dynamic growth which will continue well into the next decade.

The principle was first used to prevent external corrosion on oil and gas transmission lines and has proved its value so well that it's used on all new lines. Gas and water distribution piping, industrial plant utility piping, and process piping are applications where millions of dollars are saved annually in maintenance costs.

Cathodic protection is used for submerged surfaces in water tanks, water and sewage treatment equipment, chemical process tanks, and mixing chambers. Because the protection costs little when compared with former maintenance expense, it has been widely accepted.

Corrosion caused by salt water is stopped when cathodic protection equipment is installed on piers, ship hulls, and many other steel structures immersed in sea water.

Fume Control Equipment Must Be Tailored to Applications

—W. O. VEDDER

• Industrial growth in the next few years will add to the problem of air pollution, already severe in some industrial areas. The problem received national recognition when the National Conference on Air Pollution was called recently by the U. S. Department of Health, Education & Welfare.

Research by industrial and governmental agencies points out the complexities of industrial fume control.

More effective control of effluents can result from thorough study of offending processes or operations, and modification of present equipment.

Advances are being made constantly in fume and dust control equipment. Corrosion and heat resistant materials permit the modification of conventional fume control equipment for more effective use.

It is advisable to study the applicability of equipment to each fume control problem before installing it. If successful fume control cannot be studied in a plant similar to the one where the equipment is to be installed, a pilot plant test can establish requirements and specifications for the full scale installation.

Industry's Housekeeping Standards Get Stiffer

—ORVILLE C. HOGNANDER

• Because of increasing labor costs for manual sweeping and greatly changed housekeeping standards, it is likely that mechanical sweeping (even in congested areas) will be expanded significantly this year.

Missile manufacturing, the jet age, and public interest in controlling industrial dust nuisances are all having a marked effect on mechanical sweeping. Almost overnight, fine dusts and dirt have attained new stature as villians, upsetting previous standards of cleanliness.

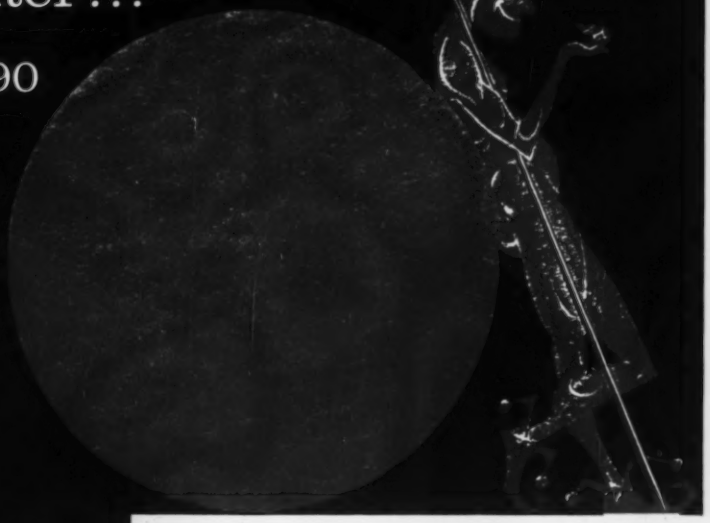
Jet engines, for example, can be seriously damaged by dust from cracks and joints in paved taxiways and similar airport areas. Similarly, minute dust and ultrafine dirt—in certain phases of rocket and space missile assembly—become

the "RED DEVIL"

IT'S NEW... Another Respiratory "FIRST"!

R-90 Variable Density Filter...

For the AO R-2090 Respirator



Greatest technical advance since American Optical introduced "impregnated (electrostatic) felt" in our R-25 filters which now give way to continuing AO research and progress. The Red Devil is available only from AO — provides amazingly high filtering efficiency, plus very low breathing resistance and unusually long service life because of a built-in pre-filter. BM approved for all dusts not significantly more toxic than lead, pneumoconiosis-producing mists and chromic acid mist. Act TODAY — equip personnel with the AO R-2090.

NEW 315 FOUNDRY GOGGLE

Foundrymen like the greater protection from the larger mask . . . the better vision from 57.8 mm. wide vision lenses . . . the stepped up (double) ventilation from a 40 mesh screen. Fits over most spectacle glasses. Adjustable rubber headband "clips" through metal frame for close fit. Soft plastic mask standard — leather available. Super Armorplate clear or Calobar lenses. Goggle also available with 150 mesh inner screen set behind a 16 mesh screen for dust protection — ask for No. 316.

AO ALUMINIZED FACE SHIELD

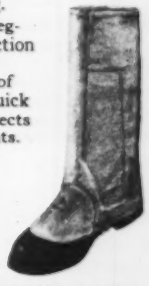
REFLECTS 80% OF RADIANT HEAT

Our H3W84AL keeps workers cooler, more efficient on operations such as furnace inspection. Aluminizing also cuts window replacement costs — windows unaffected by heat crazing and warping last four times as long! Windows interchange easily because of patented floating snap fasteners. Deeper spark deflector for greater protection. Leather sweatband. For metal pouring, furnace work, etc.

AO 4901SA SILVABESTOS LEGGING

FABRIC — Latest in lighterweight materials offering protection against metal splash, heat and abrasion. Base material is asbestos with an aluminized-resin coating.

FEATURES — Quick release, knee-length legging — reinforced with fibre for shin protection and rigidity. Steel stay down length of legging positioned at bottom, and choice of 4 points at top. Leather tab at top for quick release. Leather flare and understrap protects instep. Also available in ankle length spats. Cat. No. 4903SA.



Write for Additional Information

Always insist on AO Trademarked Safety Products

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASS.
Safety Service Centers in Principal Cities

Service and Maintenance

W. E. KEMP
Technical Director—Coatings
Koppers Co. Inc.
Tar Products Div.
Pittsburgh

ROBERT DVORIN
Manager, Industrial Waste Treatment
Graver Water Conditioning Co.
New York

ROBERT C. HOOD
President
Ansul Chemical Co.
Marinette, Wis.

alarmingly important. Supersonic speeds and changed weight relationships make a big difference; and "white room" precision assembly areas now exceed hospital standards of cleanliness.

Removal of fine dust and dirt has become more important in industry. Increased plant output and the expansion of suburbs have resulted in the adoption of many techniques to reduce airborne dusts and generally improve industrial housekeeping.

Improved, high capacity, vacuumized sweepers have become standard equipment in certain dust problem industries, such as cement plants. They are also being used in ferrous and nonferrous metalworking plants.

A development in mechanical sweeping which saves travel time in sweeping plant aisles: Sweepers are built to fit the aisles. Sweeper manufacturers are working closely with industrial architects to determine sweeper dimensions for most economical use.

Cold Cured Finishes To Be Developed

—W. E. KEMP

• Developments in protective coatings will include chemically cured, solid coatings which are free from solvents or fire hazard, chemically cured, water emulsion coatings, and field applied coatings (organic and inorganic) which will exhibit high corrosion resistance and will not deteriorate at temperatures as high as 700° F.

In the last five years, a number of new organic and inorganic protective coatings have been developed for steel in corrosive environments.

Hot line coal tar enamels have extended the temperature range of hot applied thick mastics (90 to 100 mils) to 225° F. Extremely fast drying primers, synthetic resin based, show outstanding adhesion to steel and enamel under the most adverse temperature and humidity conditions.

Coatings of intermediate thickness (10 to 30 mils), include thermoplastic types that have little or no flow at temperatures up to 300° F, exhibit excellent corrosion resistance, and bond to a wide variety of surfaces with little surface preparation.

Epoxy resins, formulated with coal tar and cured at room temperature, show outstanding adhesion to steel and many other metals. They resist temperatures as low as −60° F and as high as 400° F.

Thin coatings (1-7 mils) include the zinc rich coatings, most of which are inorganic. For steel in marine service, they offer protection and freedom from explosion hazard during application, but their life expectancy depends on the rate of zinc loss from galvanic action.

Breakthrough Seen in Recovery Of Pickling Liquor in '59

—ROBERT DVORIN

• A dialysis system that can treat acid liquors and recover acids in tonnage quantities may provide the big breakthrough in pickle liquor treatment in 1959. It is estimated that 275,000 tons of free acid and 650,000 tons of ferrous sulfate are discharged annually in about 1 billion gallons of water. Up to 90 per cent of the acid can be recovered by dialysis; metal products are also recovered.

The new system is relatively simple in design and operation. It takes little floor space, requires no power, chemicals, or fuel for operation, and involves low capital investment.

An important feature of the system is its high transfer rate, due to the way it's designed and the plastic membranes used in it.

Maintenance cost is low because the membranes have high tensile strength and can be used for several years. The equipment requires only one operator, working part time, to see that the feed and recirculating pumps are operating properly.

The system operates on tap water and, in most cases, no water treatment is necessary.

In operation at a steel mill, the system recovers acid, leaving ferrous sulfate with a low acid content as a waste stream. Iron is then precipitated with lime or recovered by other available methods. Such a system reduces the amount of acid used in a process by permitting re-use of acids in process liquors; permits recovery of valuable products in the liquor by removing acids; and eliminates or substantially reduces the amount of acid to be neutralized. A higher concentration of acid can be used in the pickling bath, because the system operates at its best with highly concentrated solutions.

Recommends Dry Chemicals For Fire Protection

—ROBERT C. HOOD

• The metalworking industry will have better fire protection equipment in the early sixties—probably at no increase in cost.

There will be increased use of dry chemical extinguishing equipment in the form of portable fire extinguishers, hose systems, and systems incorporating use of piping with discharge through fixed nozzles.

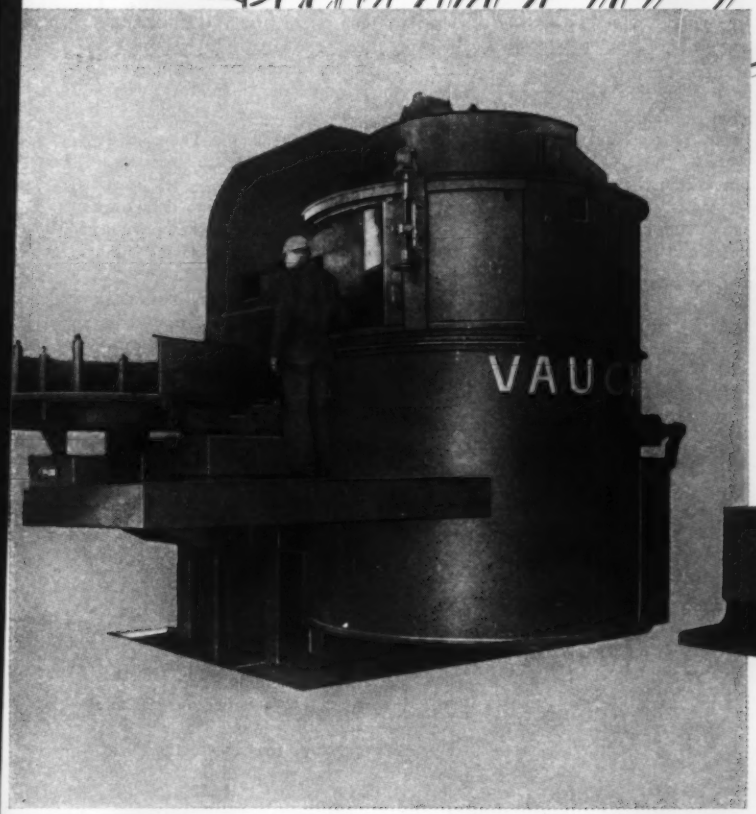
Carbon dioxide extinguishers will be used only where special conditions make dry chemical extinguishers unsuitable (even though more effective).

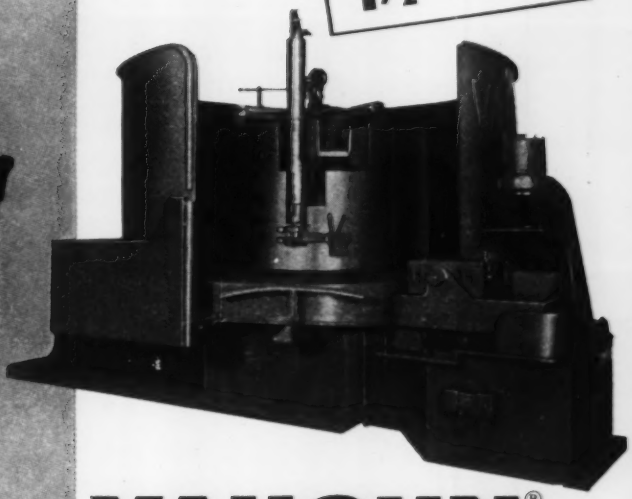
The newest of the dry chemical methods, the use of fixed nozzles, protects steel and aluminum rolling mills, oil quench tanks, and other flammable liquids. Once magnesium was the only combustible metal in the metalworking industry. Now there are several, with titanium and zirconium being the most common.

At present, two extinguishing agents

HERE'S *high speed* PRODUCTION OF *long* THIN WALL TUBING IN COILS

1½" TO ¼"





VAUGHN® TubeBLOC®

For copper or aluminum tubing, Vaughn TubeBloc machines start at 1½" dia. maximum tubing and will finish down to approximately ¼" dia. minimum. 60" diameter blocks run at speeds up to 2,000 ft. per min. ● With the **Vertical Type** (above, right), length of tubing is not limited by the diameter and length of the block. Finished bundle is removed by block stripping spider. ● With the **Inverted Type** (above, left), length of tubing is governed by diameter and length of block. No block stripping spider is required. Convolutions of tubing are laid side by side from top to bottom of block by traversing die holder mechanism.

Ⓥ®

"Quick on the Draw!"

THE VAUGHN MACHINERY COMPANY

Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

Draw your thin-wall tubing in *long* lengths . . . in easy to handle coils . . . conveyorized to speed production flow . . . *and you're in step with the best!* Use either the Upright or Inverted VAUGHN TubeBloc as required by your conditions, and profit by speeds up to 2000 fpm—in finished sizes from 1½" to ¼". Consult us, without obligation.

Service and Maintenance

CHARLES E. FLORA
Manager of Industrial Sales
Davey Compressor Co.
Kent, Ohio

C. H. HEMPEL
President
Heresite & Chemical Co.
Manitowoc, Wis.

C. FRED YTTERBERG
President
Kalman Floor Co. Inc.
New York

for combustible metals are listed and approved by insurance companies. One is a graphite-base material which must be applied by scoop or shovel, and the other is a salt-base material which may be applied from extinguishers.

There are two other extinguishing agents suitable for fires in certain metals. One extinguishes fires in titanium turnings. It is a flammable liquid that burns and deposits an oxygen-excluding coat over the burning metal. The other, a special extinguishing agent, consists of graphite in a special form for expulsion from extinguishers. It was developed for use on fires in lithium.

Expects Wider Acceptance Of Rotary Compressors

—CHARLES E. FLORA

• It has been said that we have left the air age and have entered the space age. We believe a more appropriate term would be the age of technical progress.

During the next ten years, we will probably have reached the moon, or beyond. The speed of technological change and advancement is constantly increasing.

It is the responsibility of every industrial purchaser to buy only the capital equipment that will meet ever higher production standards and quotas.

In the air compressor industry, the greatest technical advances have been made with positive displacement rotary type compressors. Continued improvement can be expected in present designs. More compressor manufacturers will place rotary compressors on the market this year.

The changeover from reciprocating to rotary compressors will continue. The biggest single factor holding back this change is the lack of available information on rotary compressors at the industrial buying level.

People hesitate to accept anything they do not understand. A complete education program must be designed to inform industry what rotary compressors are available and to demonstrate how they differ from reciprocating units.

Improved Organic Coatings Will Protect Steel

—C. H. HEMPEL

• Corrosion of steel is more important than ever before in these days of high replacement costs. Although we may expect some new corrosion resistant alloys for certain special conditions, most emphasis will be placed on organic protective coatings for steel.

It is not likely that any other metal will ever replace steel as the fundamental metal of construction because of its strength, workability, abundance, and relative low cost. Its one weakness, corrosion, can be minimized by the right protective measures.

Corrosion may range from rust (atmospheric corrosion) to more complex forms found in chemical processing industries. Protective measures can be anything from red lead shop coat to the more complex baked resin coatings.

In the past, phenolic resin coatings were known to be brittle; recent improvements have overcome that problem. Flexible resin coatings can now be used in many applications not possible before; as a result, steel can be put to even wider use.

Pure resin coatings are gaining in popularity because of their chemical resistance, hardness, and heat resistance.

They can be subjected to temperatures as high as 600° F for 4 hours, or 500° for 100 hours before starting to deteriorate.

Surface preparation is vitally important; more efficient cleaners, inhibited pickling and etching baths, passivating pretreatments, and abrasive blasting techniques will find wider use.

Anticorrosive pigments are being used more in organic protective coatings. Equipment for water treating and heating—industrial, commercial, or domestic —will require improved corrosion protection because of increased demand for pure water.

The chemical and petroleum industries will need large quantities of protective coatings for factories, pipelines, tank cars, tank trailers, marine tankers, and storage or docking facilities.

Baked coatings, particularly the baked pure phenolics, will be used more in steel containers, appliances, and the chemical processing equipment, where coatings of the highest chemical resistance are required.

More Spending Expected for Quality Industrial Floors

—C. FRED YTTERBERG

• This year will be a better one, financially speaking, than was 1958. The industrial segment of the construction field will gain ground, but will fall short of the 1957 level.

Until now, most emphasis has been placed on better ways to make or process metal. Little attention, in comparison, has been given the housing of production facilities.

A general loosening of purse strings can be expected when budgets are set up this year. Last year, many builders were forced to cut corners because of small budgets.

Advances in industrial technology will call for more emphasis on quality in construction.

Research and development programs will not be started for improvement of industrial floors—but present programs will be continued and, in some cases, enlarged.

Demand for industrial floors that do not "dust" will increase. It is likely that germ-free or germ retardant floors will be standard for some applications in the near future.

fifteen foot aluminum logs...just so many matchsticks

At Wolverine Tube you just touch a button and 25 tons of aluminum logs are whisked into this huge Despatch Homogenizing Oven.

The door shuts automatically and the great aluminum logs begin a two to eight hour 1000° F. heat bath. The result: aluminum billets with perfect metallurgical and chemical uniformity—and no casting stresses. This means faster extrusion at lower temperatures and pressures, and a product with a better finish.

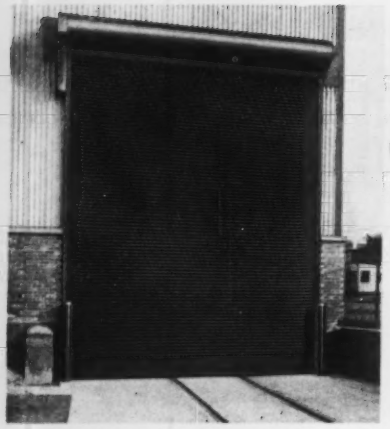
A second Despatch Oven ages and anneals extruded tubing. This oven has a tremendous temperature range—200° to 1000° F. It replaced another oven that would not perform to Wolverine Tube's high standards.

A Wolverine Tube official says: "We could have bought cheaper ovens, but we bought from Despatch because it has a good reputation for making quality products."

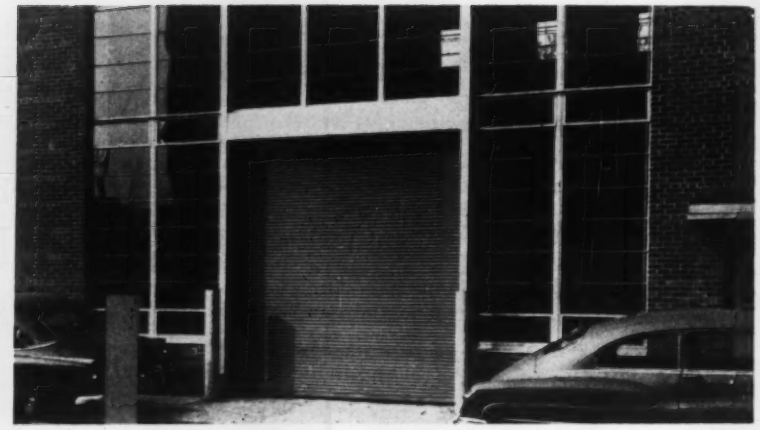
More proof of Despatch's leadership in the heat processing industry. If you have *any* heat processing needs, large or small, you can rely on Despatch's unmatched experience—50 years and 50,000 installations. For information, write or call:

DESPATCH OVEN COMPANY
619 Southeast Eighth Street, Minneapolis 14, Minnesota, Dept. 12D

DESPATCH

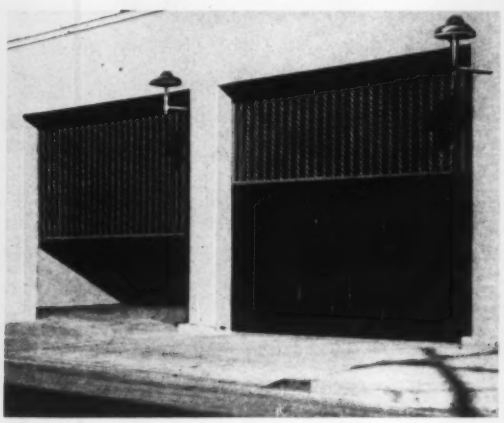


Kinnear Rolling Doors, by allowing for any required track extension, permit fullest use of hoist, crane, conveyor and lift-truck equipment.



Kinnear Rolling Doors eliminate all problems where wall areas beside or above doorways are designed to provide a view or transmit light. Kinnear Doors clear the entire door area, yet never interfere with any function or usability of surrounding floor, wall, or ceiling, either inside or outside the building.

Kinnear Rolling Doors deliver full efficiency whether mounted on interior or exterior walls. Mounted outside, they permit full clearance of *ceiling-high* openings . . . also cut costs of new buildings by reducing door headroom requirements to zero!*



Kinnear Rolling Grilles combine coiling upward action of Kinnear Rolling Doors with a rugged assembly of steel bars and links in attractive "openwork" design. They prevent trespassing without blocking light, air, or vision.

How you save space, speed traffic and cut upkeep with

KINNEAR ROLLING DOORS and Rolling Grilles

Kinnear *originated* the door with the curtain of interlocking steel slats. It has so many advantages that only a few highlights can be given here.

For example, note that *all* surrounding floor and wall space remains clear and usable at all times, whether the door is opened, closed, or in action.

The closed door guards the opening with a *continuous all-metal curtain*—extra protection against intruders, vandals, troublemakers as well as against wind, weather and fire.

Every Kinnear Door is *Registered*. Full details of all parts are kept permanently in Kinnear's fireproof vaults. With parts *always* replaceable, your doors will never be "orphans".

For maximum durability Kinnear's special hot-dip galvanizing coats the entire curtain with a full *1.25 ounces of pure zinc per square foot of metal* (ASTM standards). Kinnear adds a special Paint Bond that permits immediate, thorough coverage and lasting adhesion of field-applied paint.

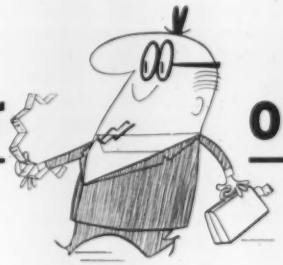
Kinnear Rolling Doors are available for old or new buildings, with motor, manual or mechanical operation. Write for complete information.

✱ *Also available:* Interlocking-slat Kinnear Doors of modified design, for COUNTER SHUTTERS—widely used in cafeterias, serving counters, tool and parts cribs, etc.

The Kinnear Manufacturing Co.
Factories: 1780-1800 Fields Avenue, Columbus 16, O.
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

Saving Ways in Doorways **KINNEAR ROLLING DOORS**

1959 Calendar of Meetings



JANUARY

Jan. 11-14, Institute of Scrap Iron & Steel Inc.: Annual convention, Waldorf-Astoria Hotel, New York. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: Edwin C. Barringer.

Jan. 12-16, Society of Automotive Engineers: Annual meeting and engineering display, Sheraton-Cadillac and Statler-Hilton Hotels, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Jan. 15, Malleable Founders' Society: Semiannual meeting, Hotel Sheraton-Cleveland, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Jan. 19-20, Industrial Heating Equipment Association: Annual meeting, Hotel Sheraton-Cleveland, Cleveland. Association's address: Associations Bldg., Washington 6, D. C. Secretary: Robert E. Fleming.

Jan. 19-22, American Road Builders Association: Annual meeting, Statler-Hilton Hotel, Dallas. Association's address: 600 World Center Bldg., Washington 6, D. C. Executive vice president: L. W. Prentiss.

Jan. 20-21, Steel Shipping Containers Institute Inc.: Winter meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 25-29, Associated Equipment Distributors: Annual meeting, Conrad Hilton Hotel, Chicago. Association's address: 30 E. Cedar St., Chicago 11, Ill. Executive secretary: P. D. Hermann.

Jan. 26-28, American Management Association: West coast general management conference, Statler-Hilton Hotel, Los Angeles. Association's address: 1515 Broadway, New York 36, N. Y. General management division's manager: David J. Secunda.

Jan. 26-29, American Society of Heating & Air-Conditioning Engineers: International heating and air conditioning exposition and annual meeting, Convention Hall, Philadelphia. Society's address: 62 Worth St., New York, N. Y. Executive secretary: A. V. Hutchinson.

Jan. 26-29, Plant Maintenance & Engineering Show: Public Auditorium, Cleveland. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 26-28, Truck-Trailer Manufacturers Association: Annual meeting, Hollywood Beach Hotel, Hollywood, Fla. Association's address: 710 Albee Bldg., Washington 5, D. C. Executive manager: John B. Hulse.

Jan. 29-30, Steel Plate Fabricators Association: Annual meeting, Roosevelt Hotel, New Orleans. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

FEBRUARY

Feb. 2-7, American Institute of Electrical Engineers: Winter general meeting, Statler-Hilton and Sheraton-McAlpin Hotels, New York. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Feb. 2-7, American Society for Testing Materials: Committee week, Penn-Sheraton Hotel, Pittsburgh. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Feb. 9-11, American Management Association: Marketing conference, Statler-Hilton Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. Marketing division's manager: Coleman Lee Finkel.

Feb. 15-19, American Institute of Mining, Metallurgical & Petroleum Engineers Inc.: Annual meeting, St. Francis, Sheraton-Palace, Sir Francis Drake Hotels, San Francisco. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Feb. 16-18, American Management Association: Midwinter personnel conference, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. Personnel division's manager: John D. Staley.

Feb. 18-19, Malleable Founders' Society: Technical & operation conference, Wade Park Manor Hotel, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Feb. 26-27, Alloy Casting Institute: Winter meeting, Boca Raton Hotel, Boca Raton, Fla. Institute's address: 286 Old Country Rd., Mineola, N. Y. Executive vice president: E. A. Schoefer.

MARCH

Mar. 9-10, Steel Founders' Society of America: Annual meeting, Drake Hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Mar. 11-13, Pressed Metal Institute: Spring technical meeting, Pick-Congress Hotel, Chicago. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Mar. 16-18, Society of Automotive Engineers: National passenger car, body, and materials meeting, Sheraton-Cadillac Hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 16-20, National Association of Corrosion Engineers: Annual conference and exhibit, Sherman Hotel, Chicago. Association's address: 1061 M & M Bldg., Houston 2, Tex. Secretary: T. J. Hull.

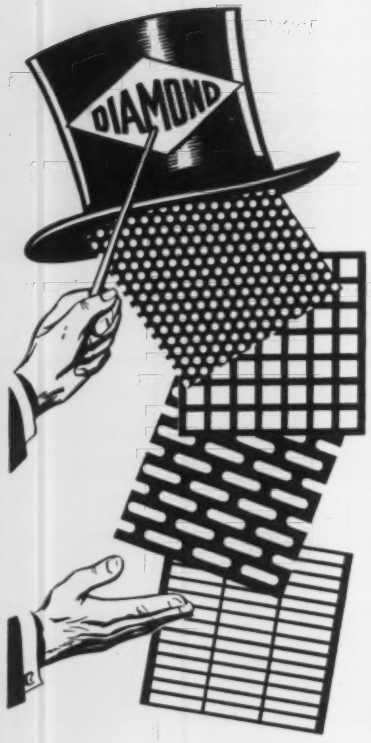
Mar. 16-20, Western Metal Exposition & Congress: Pan Pacific Auditorium and Ambassador Hotel, Los Angeles. Sponsor: American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Assistant secretary: Ray T. Bayless.

Mar. 17-19, Investment Casting Institute: Annual meeting, Surf Rider Hotel, Santa Monica, Calif. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: H. P. Dolan.

Mar. 17-19, American Machine Tool Distributors Association: Spring meeting, Sheraton Park Hotel, Washington, D. C. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Mar. 19-20, Society of Automotive Engineers: National production meeting, Sheraton-Cadillac Hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 31-April 3, Society of Automotive Engineers: National aeronautic meeting and production forum, and aircraft engi-



Top-Hat Quality IN Perforated Metal

The popular Diamond Perforated-metal patterns shown above are only a few of the many illustrated and described in our 32-page Catalog No. 39. All of these standard patterns are available in a wide range of unit-opening sizes and we are always equally pleased to quote on original designs of any type or size.

Catalog 39 also illustrates and describes our high-quality lines of *Ornamental Cane*, Perforated-Metal Sheets for Accoustical installations and Heavy-Duty Architectural Grilles. Write, today, for a free copy.

Correspondence is especially invited regarding ANY requirement for perforated-metal panels or parts. We are equipped to fabricate special sections to any desired extent and welcome opportunities to make money-saving suggestions.

DIAMOND MFG. CO.
WYOMING WILKES BARRE AREA PA.

Manufacturers of DIAMONTEX, the Perforated Metal Lay-In panel for better Acoustical Ceilings. New Bulletin No. 47, gives complete information. Write, today, for free copy.

neering display. Hotel Commodore, New York. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

APRIL

Apr. 2-3, Metallurgical Society of AIME: Conference on physical metallurgy of stress-corrosion fracture, Mellon Institute, Pittsburgh. Society's address: 29 W. 39th St., New York 18, N. Y.

Apr. 5-9, Nuclear Congress and Atomfair: Public Auditorium, Cleveland. Co-ordinator: Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. Secretary: E. Paul Lange.

Apr. 6-8, American Hot Dip Galvanizers Association Inc.: Annual meeting, Empress Hotel, Miami Beach, Fla. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Apr. 6-8, American Institute of Mining, Metallurgical & Petroleum Engineers Inc.: Blast furnace and open hearth conference, Hotel Jefferson, St. Louis. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Apr. 6-8, National Association of Waste Material Dealers Inc.: Annual convention, Edgewater Beach Hotel, Chicago. Association's address: 271 Madison Ave., New York 16, N. Y. Managing director: Clinton M. White.

Apr. 6-10, American Welding Society: Welding show and technical meeting, International Amphitheatre and Sherman Hotel, Chicago: Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Apr. 13-17, American Foundrymen's Society: Annual meeting and engineered castings show, Sherman and Morrison Hotels, Chicago. Society's address: Golf and Wolf Roads, Des Plaines, Ill. General manager: W. W. Maloney.

Apr. 13-17, American Management Association: National packaging exposition, International Amphitheatre, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Apr. 14-16, Steel Shipping Containers Institute Inc.: Annual meeting, Miami, Beach, Fla. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Apr. 16-17, American Institute of Steel Construction: National engineering conference, Dinkler-Tutweiler Hotel, Birmingham. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. Abbett Post.

Apr. 16-17, Magnesium Association: Spring meeting, Congress Hotel, Chicago. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

ACRO
WELDER MFG. CO.
MILWAUKEE

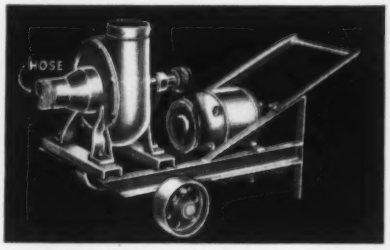
WELDING ENGINEERS

MACHINERY BUILDERS

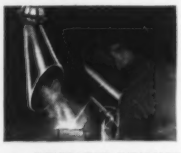
ESTABLISHED
1936

RUEMELIN *Portable*
Fume Collector

Removes gas, smoke and heat from welding operations. Recommended for ventilation of tank interiors, manholes, vats, airplane fuselages or for blowing fresh air into inaccessible places.



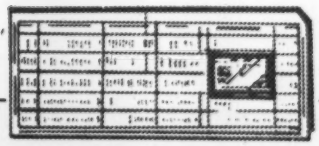
• Collector is equipped with a power unit capable of handling up to 35 ft. of steel tubing. Mounted on rubber tired wheels for ease of handling. Models also available mounted on steel legs for hose operation in a complete 360 degree circle.



• This view shows inlet hood picking up welding smoke. Operator breathing zone protected.

WRITE FOR DETAILED INFORMATION.
RUEMELIN MFG. CO.
3882 N. Palmer St., Milwaukee 12, Wis. U.S.A.
Manufacturers and Engineers • Sand Blast and Dust Collecting Equipment • Welding Fume Collectors

A7-9355-1/6



Have You Heard About Automation for the Engineering Dept.?

Filmsort®

Aperture Cards

The engineering department has its own automation system. The engineers call it automated documentation.

The input is microfilm of engineering drawings. The running time is almost no time at all. The output is prints from electrostatic masters, vellums or sulphite at the lowest costs yet.

For automated documentation, the engineers use a special card—the Filmsort aperture card. You can find out more about this new form of automation by asking for our booklet, "The Filmsort Aperture Card for Your Engineering Drawings and Allied Records."

The Filmsort Company
Pearl River, N.Y.
A DIVISION OF MIEHLE-GOSS-DEXTER, INC.

WARD STEEL CO.

We specialize in
FINISHED STEEL
BARS—TUBES—STRIP

PROMPT WAREHOUSE SERVICE ONLY

Most Complete Stock in America of
BLUE TEMPERED SPRING STEEL

We believe that the way to sell is to carry a stock which permits satisfying any reasonable warehouse demand.

87A Rindge Ave. Ext. Phone UN 4-2460
CAMBRIDGE 40, MASS.

Branch:
3042-3058 W. 51st Street, CHICAGO, ILL.
Phone: Grovehill 6-2600

Apr. 18-22, American Society of Tool Engineers: Annual meeting, Milwaukee. Society's address: 10700 Puritan Ave., Detroit 38, Mich. Executive secretary: Harry E. Conrad.

Apr. 20-22, Metal Powder Industries Federation: Annual meeting and powder metallurgy show, Sheraton-Cadillac Hotel, Detroit. Federation's address: 130 W. 42nd St., New York 36, N. Y. Executive secretary: Kempton H. Roll.

Apr. 21-23, American Society of Lubrication Engineers: Annual meeting, Statler-Hilton Hotel, Buffalo. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: Calvert L. Willey.

Apr. 22-24, American Zinc Institute Inc. and Lead Industries Association: Annual meetings, Drake Hotel, Chicago. Information: Lead Industries Association, 60 E. 42nd St., New York 17, N. Y. Secretary: Robert Ziegfeld.

Apr. 23-25, Metal Treating Institute: Spring meeting, Hollywood Beach Hotel, Hollywood, Fla. Institute's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Harington.

Apr. 26-29, National Screw Machine Products Association: Annual meeting, Roosevelt Hotel, New York. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Apr. 27-29, Association of Iron & Steel Engineers: Spring conference, Statler-Hilton Hotel, Buffalo. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 27-29, Chamber of Commerce of the U. S.: Annual meeting, Chamber Bldg., Washington. Chamber's address: 1615 H St., Washington 6, D. C. Executive vice president: Arch N. Booth.

Apr. 27-29, Grinding Wheel Institute and Abrasive Grain Association: Semiannual meeting, Homestead Hotel, Hot Springs, Va. Information: Thomas Associates, 2130 Keith Bldg., Cleveland 15, Ohio. Business manager: W. B. Thomas.

MAY

May 3-6, American Steel Warehouse Association: Annual meeting, Drake Hotel, Chicago. Association's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president and secretary: Robert G. Welch.

May 3-7, Electrochemical Society Inc.: Spring meeting, Sheraton Hotel, Philadephia. Society's address: 1860 Broadway, New York 23, N. Y. Executive secretary: Robert K. Shannon.

May 10-13, Copper & Brass Research Association: Annual meeting, Homestead, Hot Springs, Va. Association's address: 420 Lexington Ave., New

A message to a leading

PROJECT ENGINEER

Would you consider a change—new climate, locale, living conditions—unique challenge, permanency and more than commensurate rewards?

Kaiser Engineers is seeking a man of unusual skill and experience. He must have at least 10 years of progressive integrated steel plant development experience. He must know plant layout, construction design, and be of managerial caliber. He will be charged with the continued development of new steel plants and the expansion of existing plants in the U.S. and abroad. His salary will be more than generous.

This man and his family will enjoy indoor-outdoor living in the mild, smog-free San Francisco Bay Area. Here are fine new schools and famous Universities, the culture and sophistication of San Francisco, plus year around recreational opportunities ranging from sea to Sierra and including all sports.

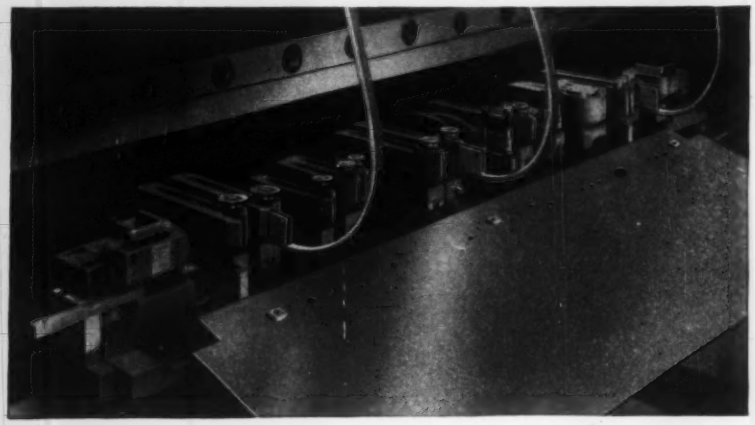
This man will enjoy, too, life insurance, free family health plan, retirement, moving allowance and other perquisites.

Can you qualify? Are you interested? If so, why not write today in strictest confidence to:

Box 719
STEEL
Penton Bldg.
Cleveland 13, Ohio

NEW STRIPPIT UNITS

. . . stake nuts permanently with every press stroke !



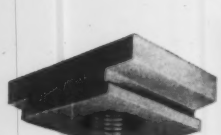
STRIPPIT PIERCE NUT UNITS save operations, time and money in assembly panel production with single-stroke insertion of Fabristeel Multipierce Nuts* into sheet metal up to .125″ thick.

Permanent Fastening by an Exclusive New Process—as nut pierces stock, metal flows into nut shoulder slot, becoming an integral part of the stock.

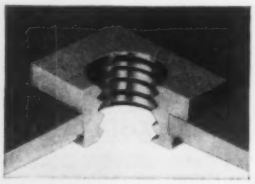
High-Speed—fast press setups, automatic feed of nuts to units for long, medium or short runs gets maximum production per press.

Flexibility—Pierce Nut Units can be quickly press-mounted in any desired pattern, changed on short notice, re-used over and over.

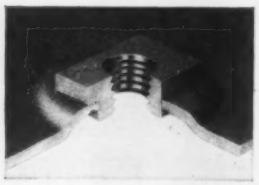
*A Product of Fabristeel Products, Inc.



Each nut is its own punch, a new one each time



Die button causes material to flow into nut slot



Simultaneous embossing for flush fastening

WRITE FOR DEMONSTRATION on your press ! The speed and simplicity of Strippit Pierce Nut operation has to be seen to be believed. Also request new catalog for complete specifications.

WALES STRIPPIT INC.

210 Buell Road, Akron, New York

A UNIT OF HOUDAILLE INDUSTRIES, INC.

In Canada: Strippit Tool & Machine Company, Brampton, Ontario

York 17, N. Y. Managing director: Theodore E. Veltfort.

May 13-15, American Supply & Machinery Manufacturers Association: Triple industrial supply convention, Statler-Hilton Hotel, Dallas. Information: Thomas Associates, Keith Bldg., Cleveland 15, Ohio. Business manager: W. B. Thomas.

May 13-15, Machinery Dealers National Association: Annual meeting, Plaza Hotel, New York. Association's address: 1346 Connecticut Ave. N. W., Washington 6, D. C. Secretary: R. K. Vinson.

May 13-15, Southern Industrial Distributors Association: Spring meeting, Statler-Hilton Hotel, Dallas, Tex. Association's address: 1626 Fulton National Bank Bldg., Atlanta, Ga. Secretary-treasurer: E. L. Pugh.

May 14-15, National Association of Sheet Metal Distributors: Spring meeting, Pick-Roosevelt Hotel, Pittsburgh. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

May 14-17, National Tool & Die Manufacturers Association: Spring board meeting, Marott Hotel, Indianapolis. Association's address: 907 Public Square Bldg., Cleveland, Ohio. Executive vice president: George S. Eaton.

May 17-20, Automotive Engine Rebuilders Association: Annual meeting, Royal York Hotel, Toronto, Ont. Association's address: 901 Roosevelt Bldg., Indianapolis 4, Ind. Executive vice president: R. G. Patterson.

May 17-20, Industrial Heating Equipment Association: Spring meeting, Homestead Hotel, Hot Springs, Va. Association's address: Associations Bldg., Washington 6, D. C. Secretary: Robert E. Fleming.

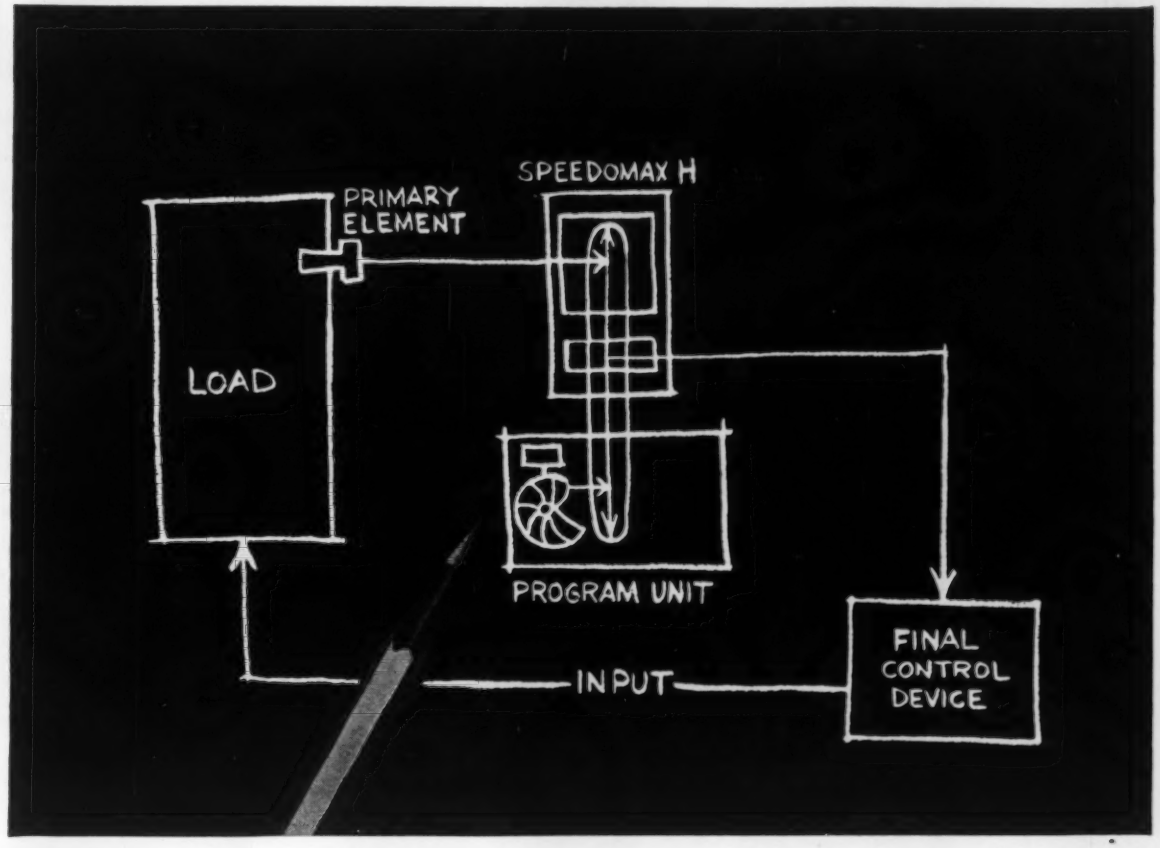
May 20-22, Electronic Industries Association: Annual meeting, Sheraton Hotel, Chicago. Association's address: 1721 DeSales St. N. W., Washington 6, D. C. Secretary: James D. Secrest.

May 20-22, Society for Experimental Stress Analysis: Spring meeting, Sheraton-Park Hotel, Washington. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

May 25-27, American Society for Quality Control: Annual meeting and exhibit, Hotel Sheraton-Cleveland, Cleveland. Society's address: 161 W. Wisconsin Ave., Milwaukee 3, Wis. Administrative secretary: W. P. Youngclaus Jr.

May 25-26, Malleable Founders' Society: Annual meeting, Homestead Hotel, Hot Springs, Va. Society's address: 1800 Union Commerce Bldg., Cleveland 14,

(*Please turn to Page 408*)



Reproduce your time-temperature cycles exactly with L&N cam-type program control

At the flip of a switch you can heat . . . soak . . . and cool at a preset rate for a preset time with L&N's improved cam type program control! Whether your program is linear or non-linear, this control will continuously regulate input to reproduce *your* cycle . . . again and again.

Heart of the system is the program unit. Essentially it's a motor-operated cam and a control slidewire. The cam is calibrated . . . making it extremely easy to lay out and cut to any time-temperature cycle. Changing a cam to meet a new program takes only a minute. For additional flexibility, the unit has seven standard speeds . . . permitting a multiple number of programs.

Other elements in the control system include a primary element, a Speedomax® recorder and associated control relay, and a final control device. Any change detected by the primary element and measured by the recorder is checked by the program unit, which regulates the final control device to keep the process on cycle.

Also available is a motor-operated front setter type of program control. Recommended for linear programs only, this system offers great flexibility within the range selected.

Both types are available for Two-Position or proportioning control . . . will regulate input to electric or fuel-fired furnaces.

Can your process benefit from programmed heating and cooling? If so, it'll pay you to investigate L&N program control. For more information, call your nearest L&N office, or write 4957 Stenton Ave., Philadelphia 44, Pa. Ask for Data Sheet ND46-33(4).

LEEDS & NORTHRUP
Instruments · Automatic Controls · Furnaces

ALLOYS ALONE ARE NOT ENOUGH!

The development of new and better alloys or improvements in making and using them is only part of the job at ELECTROMET. The service you get with the alloys you buy is equally important. Here's where ELECTROMET is really unique. Just read the following and see if you're getting the *most* out of your present alloy purchasing program.

FOR INSTANCE... ARE YOU GETTING

THIS? The combined knowledge of more than 300 skilled engineers and scientists whose experience with advanced technology can help you with your most perplexing alloy-using problems.

THIS? The experience of sales engineers skilled in the most efficient use of alloys ... ready to quickly call in ELECTROMET specialists on any technical problem that may come up.

THIS? Assurance of top quality products *every* time. Selection from more than 100 different alloys. Modern, efficient plants convenient to steelmaking centers. Equipment developments that *raise quality standards*, make economies possible.

THIS? Assurance of continuing supplies and fast delivery service from convenient, well-stocked plants and warehouses. The most important alloys are stocked by ELECTROMET near every major metal-producing center in the nation.

ELECTROMET engineers bring you on-the-job assistance in the use of alloys. Their experience backed by the entire ELECTROMET organization is your assurance of satisfaction. We invite you to call us.

THIS? Information about the latest developments in ferro-alloys, metals, and metal compounds and their contributions to industrial progress and better living. Shown here is the second issue of ELECTROMET's new 32-page quarterly magazine. Write for your free copy today.

ELECTRO METALLURGICAL COMPANY
Division of
Union Carbide Corporation
30 East 42nd Street New York 17, N. Y.

In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

(Continued from Page 404)

Ohio. Executive vice president: Lowell D. Ryan.

May 25-26, Wire Reinforcement Institute Inc.: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: National Press Bldg., Washington 4, D. C. Managing director: Frank B. Brown.

May 25-28, Design Engineering Show & Conference: Convention Hall, Philadelphia. Information: Clapp & Poliak, 341 Madison Ave., New York 17, N. Y.

May 27-28, American Iron & Steel Institute: Annual meeting, Waldorf-Astoria, New York. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

May 31-June 3, American Gear Manufacturers Association: Annual meeting, Homestead Hotel, Hot Springs, Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive director: John C. Sears.

JUNE

June 2-4, National District Heating Association: Annual meeting, Skytop Club, Skytop, Pa. Association's address: 827 N. Euclid Ave., Pittsburgh 6, Pa. Secretary-treasurer: John F. Collins Jr.

June 9-12, Material Handling Institute Inc.: National exposition of material handling equipment, Public Auditorium, Cleveland. Institute's address: 1 Gateway Center, Pittsburgh 22, Pa. Managing director: L. West Shea.

June 11-12, Pressed Metal Institute: Sales conference, Bedford Springs Hotel, Bedford, Pa. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

June 14-18, American Society of Mechanical Engineers: Semiannual meeting, Chase-Park Plaza Hotel, St. Louis. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

June 14-17, National Association of Purchasing Agents: Annual meeting and exhibit, Waldorf-Astoria Hotel, New York. Association's address: 11 Park Place, New York 7, N. Y. Executive secretary: G. W. H. Ahl.

June 14-17, National Industrial Advertisers Association: Annual meeting, Fairmont and Mark Hopkins Hotels, San Francisco. Association's address: 271 Madison Ave., New York 16, N. Y. President: John C. Freeman.

June 14-19, Society of Automotive Engineers: Summer meeting, Chalfonte-Hadden Hall, Atlantic City, N. J. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

June 15-19, American Electroplaters Society: Annual meeting and industrial finishing exposition, Statler-Hilton and Sheraton-Cadillac Hotels, and Detroit Artillery Armory, Detroit. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

June 16-19, American Marketing Association: National conference, Statler-Hilton Hotel, Cleveland. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: William C. Gordon Jr.

June 21-23, Alloy Casting Institute: Annual meeting, Homestead Hotel, Hot Springs, Va. Institute's address: 286 Old Country Rd., Mineola, N. Y. Executive vice president: E. A. Schoefer.

June 21-26, American Society for Testing Materials: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

June 22-27, American Institute of Electrical Engineers: Summer meeting, Buffalo. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

JULY-AUGUST

July 13-15, Truck-Trailer Manufacturers Association: Semiannual meeting, Homestead Hotel, Hot Springs, Va. Association's address: 710 Albee Bldg., Washington 5, D. C. Executive manager: John B. Hulse.

July 29-Aug. 1, National Tool & Die Manufacturers Association: Summer board meeting, Grand Hotel, Mackinac Island, Mich. Association's address: 907 Public Square Bldg., Cleveland, Ohio. Executive vice president: George S. Eaton.

Aug. 10-13, Society of Automotive Engineers: National west coast meeting, Hotel Georgia, Vancouver, B. C. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Aug. 19-22, American Institute of Electrical Engineers: Summer general meeting, Sacramento, Calif. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

SEPTEMBER

Sept. 13-17, Pressed Metal Institute: Annual meeting, Stanley Hotel, Estes Park, Colo. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Sept. 14-17, Society of Automotive Engineers: National farm, construction and industrial machinery meeting, production forum, and display. Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 16-17, American Die Casting Institute: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 21-22, Steel Founders' Society of America: Fall meeting, Homestead Hotel, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 21-25, Instrument-Automation Conference & Exhibit: International Amphitheatre, Chicago. Sponsor: Instrument Society of America, 313 Sixth St., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 28-Oct. 1, Association of Iron & Steel Engineers: Annual meeting and convention, Sherman Hotel, Chicago. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Sept. 28-Oct. 1, American Welding Society: National fall meeting, Sheraton-Cadillac Hotel, Detroit. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

OCTOBER

Oct. 4-7, National Association of Sheet Metal Distributors: Annual meeting, Atlantic City, N. J. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Oct. 5-7, Truck Body & Equipment Association Inc.: Annual convention and exhibit, Sherman Hotel, Chicago. Association's address: 1616 K St. N. W., Washington 6, D. C. Executive manager: Arthur K. Nuesse.

Oct. 5-10, Society of Automotive Engineers: National aeronautic meeting, aircraft manufacturing forum and engineering display, Ambassador Hotel, Los Angeles. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 7-9, Gray Iron Founders Society Inc.: Annual meeting, Fairmont Hotel, San Francisco. Society's address: 930 National City-E. 6th Bldg., Cleveland 14, Ohio. Executive vice president: Donald H. Workman.

Oct. 8-10, American Society of Tool Engineers: Semiannual meeting, Los Angeles, Calif. Society's address: 10700 Puritan Ave., Detroit 38, Mich. Executive secretary: Harry E. Conrad.

Oct. 11-16, American Society for Testing Materials: Pacific area national meeting and exhibit, Sheraton-Palace Hotel, San Francisco. Society's address: 1916 Race St., Philadephia 3, Pa. Executive secretary: Robert J. Painter.

Oct. 15-17, Foundry Equipment Manufacturers Association: Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1 Thomas Circle,

50 years of experience at Central Steel & Wire Company give warehouse service new dimensions

PLANTS AND OFFICES

CHICAGO 80, ILL. P.O. Box 3310-A, Kipsbile 7-3000
DETROIT 12, MICH. P.O. Box 148 Hamtramck Sta., TWinbrook 2-3200
CINCINNATI 14, OHIO P.O. Box 148 Annex Sta., AVon 1-2230
MILWAUKEE 1, WIS. P.O. Box 1154, HUmboldt 1-5000

Washington 5, D. C. Secretary: C. R. Heller.

Oct. 18-22, Electrochemical Society Inc.: Fall meeting, Deshler-Hilton Hotel, Columbus, Ohio. Society's address: 1860 Broadway, New York 23, N. Y. Executive secretary: Robert K. Shannon.

Oct. 18-24, American Trucking Associations Inc. Annual meeting, Statler-Hilton and Biltmore Hotels, Los Angeles. Association's address: 1424 16th St. N. W., Washington 6, D. C. General manager: R. G. Atherton.

Oct. 19-20, Magnesium Association: Annual meeting and exhibit, Roosevelt Hotel, New York. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

Oct. 19-21, American Society of Lubrication Engineers and American Society of Mechanical Engineers: Joint lubrication conference, Sheraton-McAlpin Hotel, New York. Information: ASLE, 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: Calvert L. Willey.

Oct. 25-28, American Gear Manufacturers Association: Semiannual meeting, Edgewater Beach Hotel, Chicago. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive director John C. Sears.

Oct. 25-27, American Machine Tool Distributors Association: Annual meeting, Statler-Hilton Hotel, St. Louis. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Oct. 26-31, American Institute for Electrical Engineers: Fall general meeting, Pittsburgh. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 26-28, Society of Automotive Engineers: National transportation meeting, LaSalle Hotel, Chicago. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 27-28, Society of Automotive Engineers: National diesel engine meeting, LaSalle Hotel, Chicago. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 28-30, Automotive Parts Rebuilders Association: Annual meeting and exhibit, Roosevelt Hotel, New Orleans. Association's address: 220 S. State St., Chicago 4, Ill. Executive secretary: Nathan M. Roberts.

Oct. 28-30, Society of Automotive Engineers: National fuels and lubricants meeting, LaSalle Hotel, Chicago. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 29-31, National Metal Trades Association: Annual meeting, Sheraton-Biltmore Hotel, Providence, R. I. Association's address: 337 W. Madison St., Chicago 6, Ill. Secretary: Charles L. Blatchford.

NOVEMBER

Nov. 2-5, Air-Conditioning and Refrigeration Institute: Industry exposition, Convention Hall, Atlantic City, N. J. Institute's address: 1346 Connecticut Ave. N. W., Washington 6, D. C. Managing director: Geo. S. Jones Jr.

Nov. 2-6, Metallurgical Society of AIME: Institute of Metals Division's fall meeting, Hotel Sherman, Chicago. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Nov. 2-6, National Metal Exposition & Congress: International Amphitheatre, Chicago. Sponsor: American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Assistant secretary: Ray T. Bayless.

Nov. 2-6, Society for Nondestructive Testing: Annual meeting, Hamilton Hotel, Chicago. Society's address: 1109 Minman Ave., Evanston, Ill. Secretary: Philip D. Johnson.

Nov. 3-4, Ultrasonic Manufacturers Association: Annual meeting, Hotel Sheraton, Chicago. Association's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

Nov. 4-6, Porcelain Enamel Institute: Shop practice forum, Ohio State University and Deshler-Hilton Hotel, Columbus, Ohio. Institute's address: 1145 19th St. N. W., Washington, D. C. Managing director: John C. Oliver.

Nov. 4-8, National Tool & Die Manufacturers Association: Annual meeting, Statler-Hilton Hotel, New York. Association's address: 907 Public Square Bldg., Cleveland, Ohio. Executive vice president: George S. Eaton.

Nov. 5-6, National Foundry Association: Annual meeting, Roosevelt Hotel, New York. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: C. T. Sheehan.

Nov. 5-7, Metal Treating Institute: Annual meeting, Sheraton Hotel, Chicago. Institute's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

Nov. 8-11, National Association of Aluminum Distributors: Annual meeting, El Mirador Hotel, Palm Springs, Calif. Association's address: 1900 Arch St., Philadelphia 3, Pa. Secretary: R. Bruce Wall.

Nov. 9-11, Steel Founders' Society of America: Technical and operating conference, Carter Hotel, Cleveland. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Nov. 9-13, National Electrical Manufacturers Association: Annual meeting, Traymore Hotel, Atlantic City, N. J. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Nov. 11-15, National Association of Waste Material Dealers Inc.: Fall meeting, Diplomat Hotel, Hollywood Beach, Fla. Association's address: 271 Madison Ave., New York 16, N. Y. Managing director: Clinton M. White.

Nov. 15-19, National Screw Machine Products Association: Fall meeting, Americana Hotel, Miami Beach, Fla. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Nov. 16-18, Packaging Institute: Annual meeting, Statler-Hilton, New York. Institute's address: 342 Madison Ave., New York 17, N. Y. Secretary: Charles A. Feld.

Nov. 17-20, Packaging Machinery Manufacturers Institute: Exhibition, Coliseum, New York. Show manager: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Nov. 29-Dec. 3, American Institute of Steel Construction: Annual meeting, Boca Raton Hotel, Boca Raton, Fla. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. Abbett Post.

Nov. 29-Dec. 4, American Society of Mechanical Engineers: Annual meeting, Chalfont-Haddon Hall, Atlantic City, N. J. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

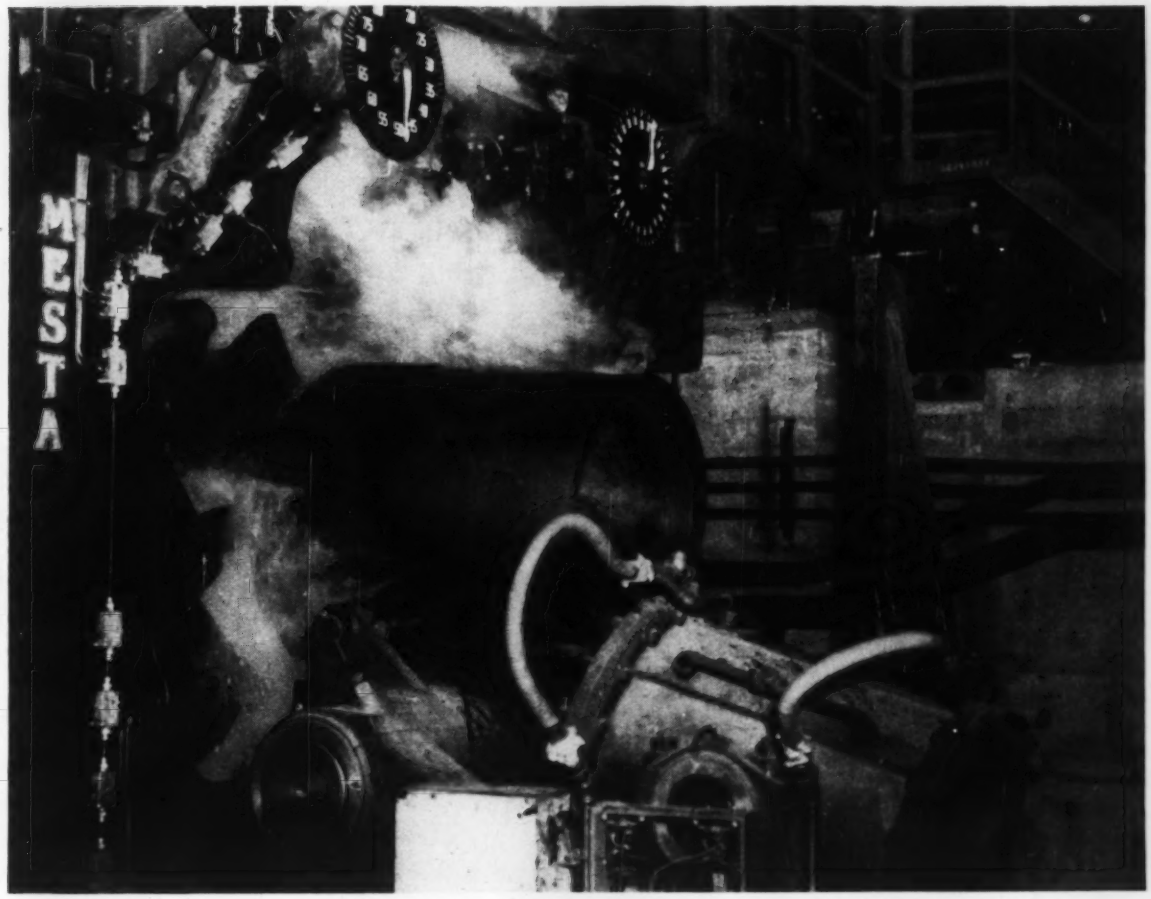
Nov. 30-Dec. 4, Exposition of Chemical Industries: Coliseum, New York. Information: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

DECEMBER

Dec. 2-4, National Association of Manufacturers: Congress of American Industry, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Executive vice president: Charles R. Sligh Jr.

Dec. 2-4, Metallurgical Society of AIME: Electric furnace steel conference, Sheraton-Cleveland Hotel, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Dec. 6-10, American Institute of Chemical Engineers: Annual meeting, Sheraton Palace Hotel, San Francisco, Calif. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Van Antwerpen.



NOW...Houghto-Safe Fluid protects this down-coiler. LAST YEAR...it would have prevented a $50,000 fire!

It happened in a hot strip mill, in Pennsylvania. A break in the hydraulic lines of one down-coiler—and oil sprayed against a hot coil. Flames instantly swept the department. Equipment and wiring were ruined, but fortunately no one was injured. Damage: $50,000 and 8 days' loss of production.

Since the fire, Houghto-Safe has been specified for all fire-danger spots throughout this mill. And, although similar line breaks have since happened, the only result was smoke and steam.

Why risk a disastrous fire in your mill? Hydraulic line leaks do happen. For a relatively small investment in Houghto-Safe fluid, you may save your plant thousands of dollars damage, and possible loss of life.

Why not join the hundreds of industrial plants which have installed over 2 million gallons of Houghto-Safe in the past five years? Write today for complete information on Houghto-Safe from: E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

HOUGHTO-SAFE HYDRAULIC FLUID

...a product of

E. F. HOUGHTON & CO.

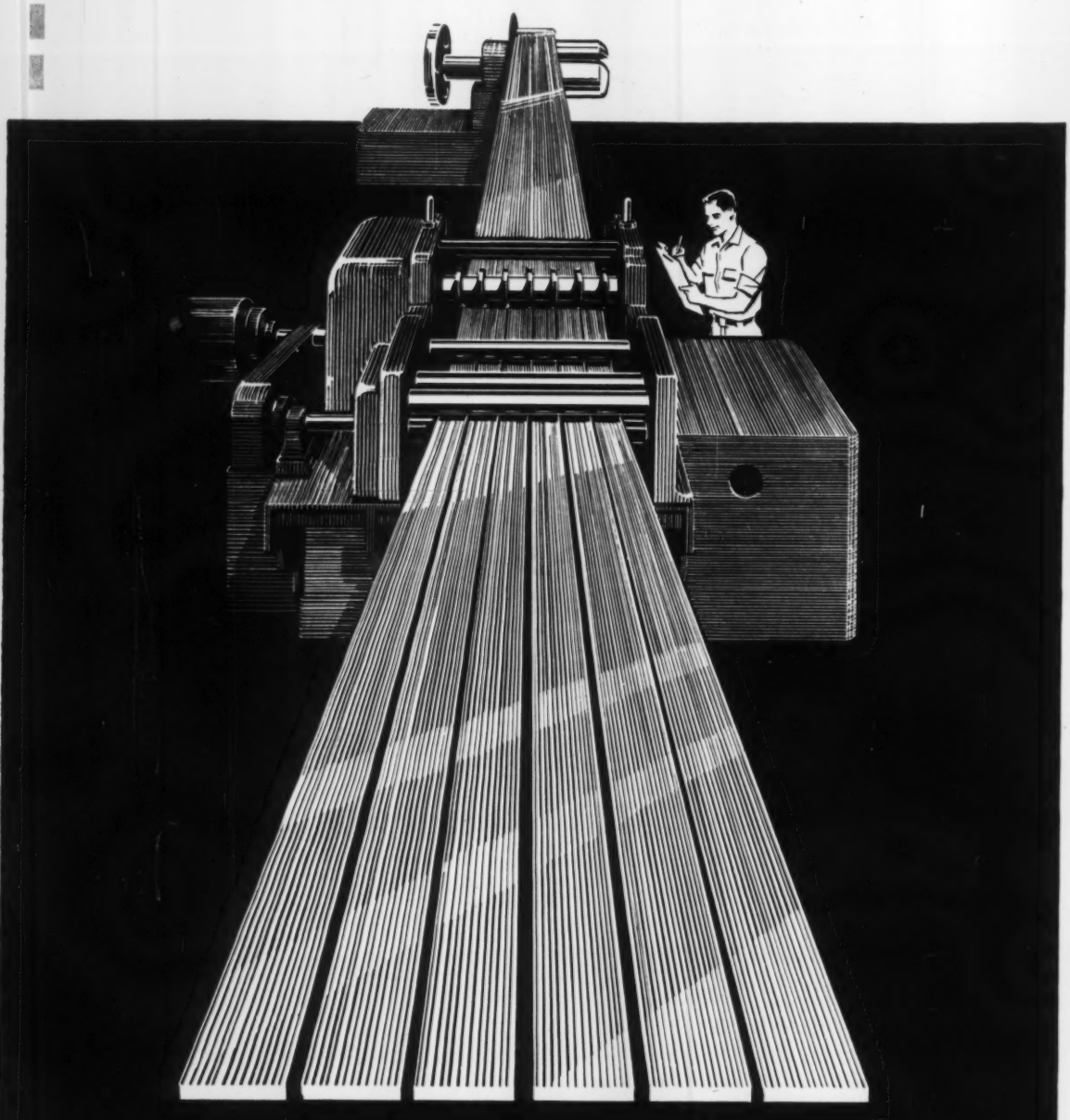
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO • TORONTO

Ready to give you on-the-job service

YODER

Rotary Slitters—Product dependability—integrity of manufacture—engineering for specific production needs have all contributed to establish Yoder equipment as the industry standard of excellence. Since 1909 Yoder-built machinery, including Pipe and Tube Mills, Roll Forming Equipment and Rotary Slitters, have earned world-wide customer satisfaction and recognition. Profit from Yoder's years of engineering and service experience. Send today for the illustrated Yoder Slitter Book.

THE YODER COMPANY • 5502 Walworth Avenue • Cleveland 2, Ohio



ENGINEERING YODER MANUFACTURING

ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES

WHAT HAPPENED IN 1958: RECESSION YEAR

THE nation sang the recession blues last year. Limited demand for metals and metal products, especially consumer reluctance to accept Detroit's 1958 models, hit most segments of metalworking hard. Steelmaking facilities were operating at less than 50 per cent of capacity in April.

The upturn started in June, and recovery continued at a steady pace. By November, steel plants were producing at nearly 75 per cent of capacity. Industry faced the new year with optimism, looking forward to a continuing upward trend in 1959.

Despite the slump, 1958 was a year of many noteworthy events. Examples: We made a lot of progress in the space race; atomic subs conquered the polar ice; the St. Lawrence Seaway opened; and Alaska became a state.

It was also a year of paradoxes. Though business was poor, the price index continued to spiral. While capital goods were begging for buyers, play products had a successful year—several firms setting sales records. Business failures hit a two year low in September.

Unions continued to win wage increases and fringe benefits. Strikes were at a ten year low. Steelworkers received a 20 cent boost on July 1. Steel prices went up an average of $4.50 per ton in August.

Research and development expanded as companies had to work harder for their share of markets. The steel industry continued to enlarge its facilities.

This chronology covers events which had significance to metalworking in 1958.

January

Steelmaking capacity reaches record 140.7 million net tons (ingots and castings), a 7.5 million ton increase from January, 1957. Outlook for 1958 production is 110.5 million net tons, vs. 113 million in 1957. Steel is readily available because of increased capacity and lower demand. Mills operating at a little over 50 per cent capacity. Scrap prices level after hitting bottom. Cost of living adjustment boosts wages 5 cents an hour.

Slight inflation and high volume in soft goods and services are expected to account for a slight rise in gross national product (to $445 billion) this year. New plant and equipment expenditures will drop from $37 billion to as low as $30 billion.

L. L. Colbert, president, Chrysler Corp., predicts retail sales of new cars may rise to 6 million mark in 1958. Preliminary reports indicate sales of 5.8 million.

Component buyers cut inventories. Only 13 per cent of respondents in survey indicate a stockpile increase.

President Eisenhower offers Congress a balanced budget of about $74 billion for fiscal 1959, including more than $40 billion for direct defense spending. He requests another $1.26 billion for defense in fiscal 1958, reflecting his confidence in a sharp upturn.

Walter Reuther substitutes a profit sharing demand for the short workweek as the economy slips.

Russia announces it will boost iron production from 85.9 million net tons in 1956 to 229.4 million net tons in 1970.

Material handling equipment makers see a $2 billion volume in 1958.

Washington announces $17.3 billion worth of new military spending in calendar 1958.

Court denies summary judgment in Bethlehem Steel Corp.-Youngstown Sheet & Tube Co. merger hearing. Trial set for Apr. 7.

Automakers expect to use 52 lb of aluminum per car in 1958, vs. 40 lb in 1957.

Federal Reserve Board lowers discount rate from 3 to 2¾ per cent.

Ford consolidates Mercury, Edsel, and Lincoln Divisions into M-E-L Div. under James J. Nance.

Retail auto deliveries are 22.2 per cent below 1957's.

February

Unemployment reaches 5.2 million.

Major producers reduce prices almost 1 per cent on two grades of stainless steel sheets and cold-rolled strip.

Everyone Responsible *for* Material Movement

should have this folder featuring ROGERS INDUSTRIAL LOCOMOTIVES

It illustrates and describes advanced features that assure greater hauling efficiency, easier control and a longer life of useful service.

5 to 40 tons capacity. Track gages 21 to 56½ inches. Diesel or gasoline engines. Hydraulic or electric transmissions. Improved exhaust scrubber. Unit welded frames and cabs. Locomotives designed to meet special requirements.

Write today for literature.

ROGERS BROTHERS CORPORATION

ALBION, PENNA.

Export Office: 50 CHURCH ST., NEW YORK 7, N. Y., U. S. A. Cable Address: Brosites

Atomic sub program gathers speed. Eighteen will be in operation by 1960.

American Motors Corp. reports it's in the black for the first time since the firm was formed in 1954, as Rambler sales boom.

Automotive steel purchases practically nil. Many February deliveries are pushed back to March.

Freight rate increases go into effect Feb. 15.

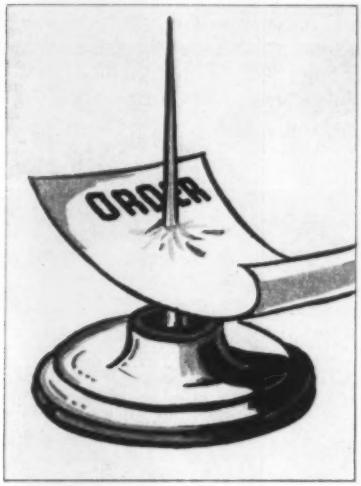
GE Vice President Roy W. Johnson heads Advanced Research Projects Agency. The new Pentagon arm will direct research and development of military space projects.

Cutting tool sales are off 30 per cent.

Steelmaking slips to 53.5 per cent of capacity (1,445,000 tons per week, vs. 2,501,000 ton rate in 1957.)

UAW pushes demands for severance pay as car sales slide; imports continue to mount. Some 300,000 foreign cars will be sold in U. S. in 1958.

Construction should be 4 per cent above 1957 record due to easier credit and ample structural steel.



Machine Tool orders hit their lowest level since 1949. Import problems get more acute in some lines, particularly standard machines.

Sen. Estes Kefauver's (D., Tenn.) Antitrust Committee charges that the $6 per ton steel boost last July "substantially exceeded" the rise in industry costs. It asks Federal Trade Commission to determine if pricing practices of the steel industry violate antitrust laws.

March

Average hourly wage rate in steel industry is record $3.09.

UAW President Walter Reuther talks tough, but members don't seem to be militant. Big Three contracts expire June 1.

Bulk of government aircraft contract negotiations take place this month. Big transfer from bombers to missiles is predicted for early 1970.

Container prices go up 2.3 per cent on Mar. 10.

Railroad working capital is down to $337,000 million, compared with $1,643,000,000 in December 1945.

Public works backlog is up.

Pentagon requests additional money for fiscal 1958 defense budget.

Machine tool orders rise slightly, but shipments slip.

Station wagons capture record percentage of car market.

Steelmaking drops to 52.5 per cent of capacity.

Switch from liquid to solid fuels for missiles is expected to boost market for aluminum.

Ford Motor Co. tests prototype

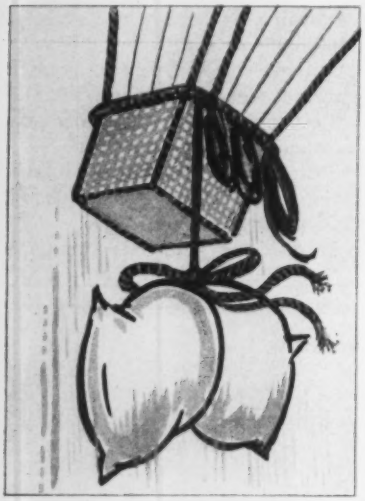
Top efficiency and versatility at low cost with Stamco side trimmer

A wide range of equipment is available for warehouse and mill duty on ferrous or non-ferrous materials. Stamco can solve your particular problem—economically. Contact us today. No obligation.

Stamco, Inc.
New Bremen, Ohio, U. S. A.

Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating, Culvert and Steel Mill Equipment

for small car. Crash program is slated for late '59 or '60. GM readies tooling for Holden, Australian subsidiary, for small car introduction in 1960.



Consumer price index continues steady rise despite the recession.

Reciprocal Trade Agreements Act is extended one year.

Pittsburgh Consolidated Coal announces its coal pipeline from Cadiz, Ohio, to the Eastlake Power Station of the Cleveland Electric Illuminating Co. will be in operation within 90 days.

Aluminum manufacturers are operating well over 75 per cent of capacity.

President Eisenhower signs bill permitting $5 billion increase in the national debt limit.

Electronics move up to fourth place in manufacturing activity in the West.

UAW and Big Three start negotiations.

Railroad freight carloadings fall below year earlier levels for 31st consecutive week.

Auto assemblies are 38 per cent below March, 1957, pace.

Ingot and casting production is lowest (18.4 million tons) for a nonstrike quarter since 1946.

April

Aluminum price cut first time in 16 years.

American Motors gets $5.5 million contract for its light Mighty Mite truck. It's designed for air transport.

Administration seeks $40.7 billion in defense funds for fiscal 1958-59, including an emergency request for an additonal $1.6 billion for top-priority aircraft and missile programs.

Steel industry operations slide to 47.6 per cent of capacity.

President Eisenhower signs $1.8 billion dollar highway construction bill, despite serious misgivings. He objects to the government's increasing share of road building costs, but hopes the act will help ease unemployment.

St. Lawrence Seaway construction gets into high gear.

Scattered nonferrous price cutting continues.

American Motors copies labor's tactics, asks UAW (among other things) for two year wage freeze until Big Three wages catch up to AMC's.

Government plans for helping the railroads include: 1. Guarantees by Uncle Sam of five-year private loans up to $500 million for the purchase of capital equipment other than rolling stock. 2. Guarantee of loans totaling $200 million for 10 per cent of the purchase price of freight cars. 3. Revamped ICC jurisdiction so that roads can more easily drop losing business such as commuter runs. 4. Revised ICC ratemaking policies so that railroads can more effectively meet competition.

Right-to-work laws become issue in seven states—Delaware, Kansas, Colorado, California, Ohio, Idaho, and Washington.

Nonferrous extrusion market growing. A 7 per cent increase over record 1956 is anticipated. Magnesium extrusions having third best year in history. Aluminum sets the pace. Copper cheapest since 1951.

Machine tool builders ask for tariff boosts as high as 50 per cent over levels set in 1934.

First quarter steel production is 18.8 million tons (54.1 per cent of capacity).

First quarter earnings of six major steel firms are 73 per cent below what they were a year earlier.

Some 450,000 UAW members are out of work and not paying dues. The union shows a deficit of nearly $500,000 in its general fund for January and February.

STEEL campaigns for the revamping of depreciation policies, backs bill by Edgar W. Hiestand (R., Calif.).

Congress authorizes $2.5 billion for an interstate highway system for fiscal 1961.

Public apathy to 1958 autos dampens hopes for business pickup.

Continued public apathy toward 1958 autos dampens hopes for business pickup.

Blast furnaces operate at only 47 per cent of capacity.

Aluminum output exceeds that of like 1957 period by 2000 tons.

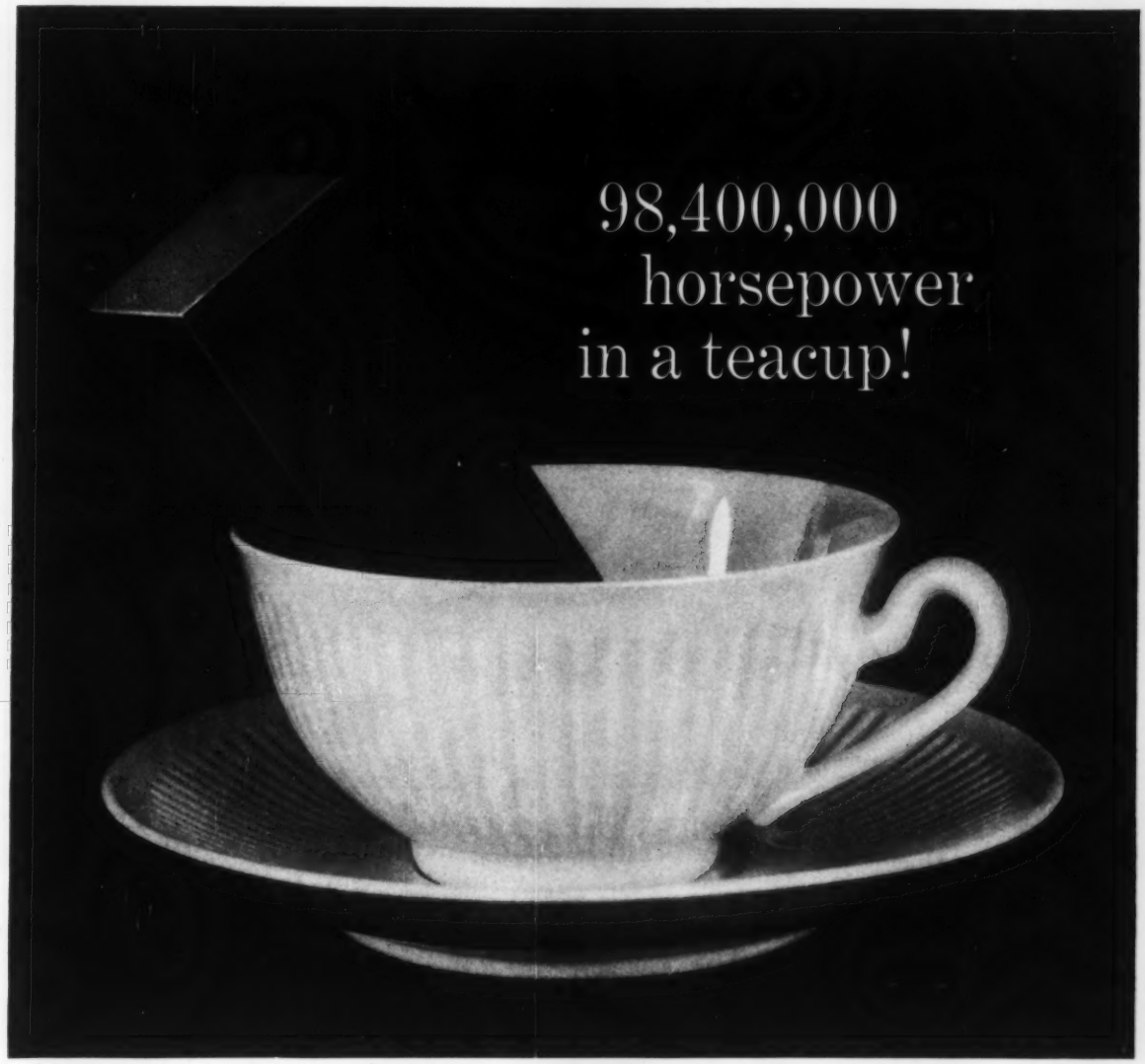
Fred A. Seaton, secretary of the interior, presents multimillion dollar metal subsidy program.

May

Russia shows big improvement in steel production.

Sen. Homer Capehart (R., Ind.) introduces depreciation bill (a tem-

(*Please turn to Page* 420)



Explosive metal forming is a reality. Parts from 5 ounces to 5,000 pounds have been formed economically with no investment in expensive equipment. Molybdenum, stainless steel, titanium, and a host of high strength heat resistant alloys have yielded to a rate of application 4,000 times faster than other forming techniques. Complex shapes are formed with a minimum of tooling. Springback is minimized and extreme accuracy is maintained. Our technical representatives can assist you with your metal forming problems. Why not investigate today? *Write or call* —

CURRENT FIELDS OF ACTIVITY:

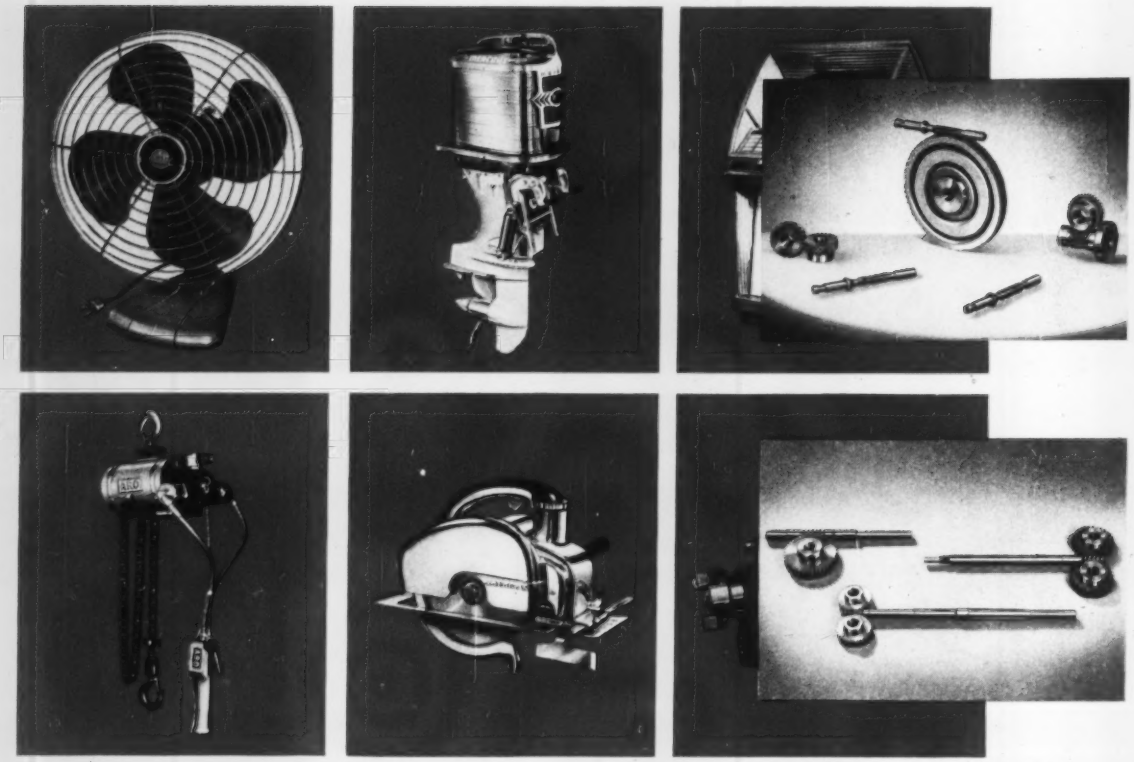
Rocket motor igniter development; gas generators; surveillance testing of explosives and ammunition; development and production of electric detonators and squibs; explosive metal forming; boron pellets.

NATIONAL NORTHERN DIVISION

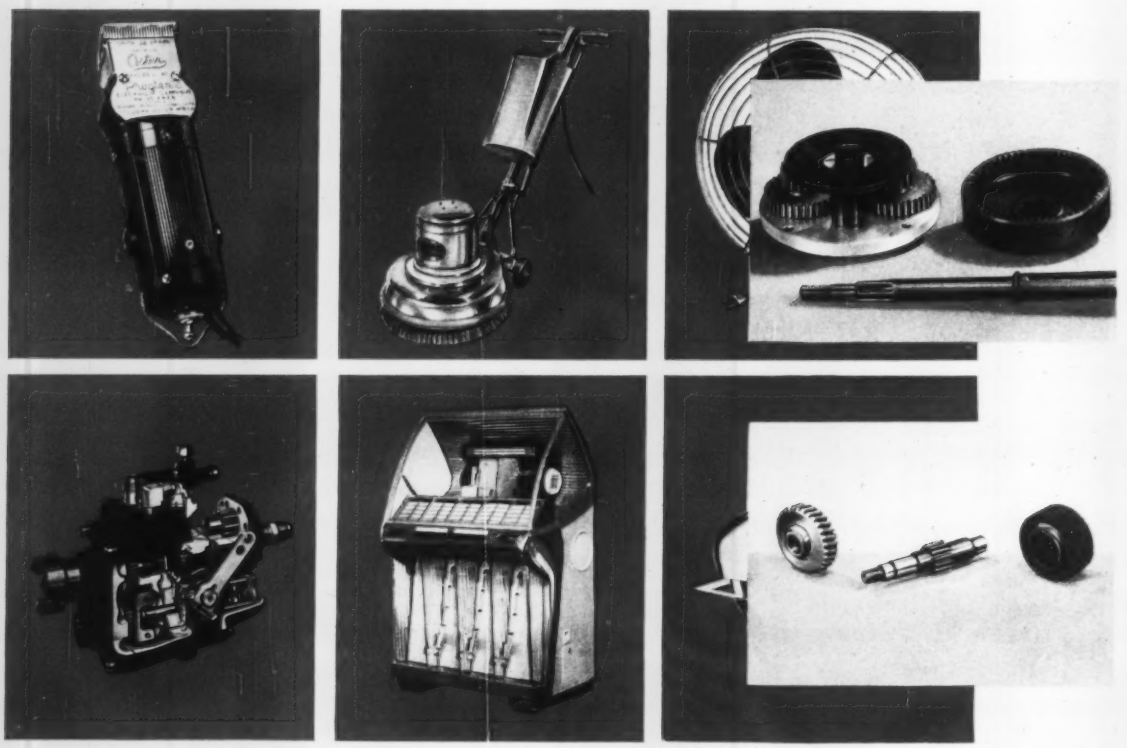
TRONA **American Potash & Chemical Corporation**

KING STREET, WEST HANOVER, MASSACHUSETTS

on the west coast—3000 WEST SIXTH STREET, LOS ANGELES 54, CALIFORNIA



for Appliances ★ Electric Motors ★ Computers ★ Missiles ★



APPLIANCES AND MACHINERY WITH NAMES YOU KNOW DEPEND ON G.S. SMALL GEARS

Have you an especially difficult, especially complex, especially critical power transmission link in your production chain, involving Fine or Intermediate Pitch Gearing? Have you been penalizing yourself with short-run production—at short-run high cost—to assure yourself of the custom precision you require? Then G.S. has a great deal to offer you.

G.S. takes great pride in the long, long list of customers who have relied on our ability and our performance for many years to supply all or the major part of their Small and Intermediate Gearing requirements. The most famous leaders in a dozen major industries are old friends—along with hundreds of smaller but mighty important producers of quality units.

A supplier has to do more than just "make gears" to develop and maintain such a business. For one thing, he must develop a staff of outstanding experts in all the phases of design and manufacture of his specialty; for another, he must maintain a sincere interest in the solution of the problems of his customers, large or small—not just a yen for another order; and third, he must be able to consistently deliver custom quality under the most demanding conditions—*at full-run production prices.*

Now well into our fifth decade of specialization, G.S. is *the world's largest exclusive manufacturer of fractional horsepower gearing*—with the most modern, most complete, most efficient manufacturing equipment and production techniques you can find, to implement our mounting years of practical experience.

We invite your inquiry about what G.S. might do for you—in terms of potential savings, improved product performance and useful life, fewer costly interruptions to your production lines because of over-variance from specifications. Our engineers are at your service to discuss development of new projects, or better means of accomplishing old ones. Call or write us today.

and all precision requirements ⋆ Custom-Quality Small Gearing by

YOU'LL FIND G.S. GEARING IN TOP QUALITY PRODUCTS LIKE THESE . . .

Adding Machines • Aircraft Carburetors & Fuel Metering Systems • Aircraft Instruments and Radios • Automatic Musical Instruments • Automation Systems • Business Machines • Check Signing & Protecting Machines • Clippers for Barbers, Animal Shearing & Hedge Trimming • Cloth Cutting Machines • Coin Changers & Counters • Communication Equipment • Control Mechanisms • Electric Fans • Electric Motors • Floor Polishers, Sanders, Scrubbers, Sweepers • Food & Drink Mixers, Blenders • Home Appliances • Lawn Sprinklers • Machine Tools • Meat Tenderizers, Grinders, Slicers • Military Equipment • Motion Picture Cameras & Projectors • Optical Instruments • Outboard Motors • Pneumatic Production Tools • Radio & Radar Tuning Assemblies • Radio Anti-backlash Gears • Range Finders • Record Changers • Sewing Machines • Steel Strap Stretchers • Step Switches • Tapping, Drilling & Threading Equipment • Telephone Dials • Television Sets • Thermostatic Controls • Typewriters • Vending Machines • Washing Machines.

•

SEND FOR G.S. *illustrated folder! See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant view, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!*

GEAR
Specialties, Inc.
2635 WEST MEDILL AVENUE
CHICAGO 47, ILLINOIS

SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

43 Years of Specializing in Small Gearing!

(*Continued from Page* 416)

porary return to five-year amortization) which is similar to STEEL's recommendation.

UAW demands total wage increase of 73 cents an hour.

Unemployment reaches 7.5 per cent of work force.

Net profits of nonferrous companies in first quarter are way off pace of same 1957 period. Sales are off, and prices are down because of overproduction, lack of demand.

Steel production is up to 50 per cent of capacity.

Construction contracts total $3,402,464, the highest figure ever reported for a single month.

Aluminum block is announced as next major change in auto engines.

Tin plate prices go up May 27.

United Steelworkers ask fabricator shops for a wage package of 15 to 16 cents this year.

Reciprocal Trade Act is extended five years.

President Eisenhower takes stand against antirecession tax cuts. Renews his recommendation for extension of present corporation and excise taxes scheduled for automatic reduction June 30.

June

Worst of the recession is felt to be over because: 1. Personal income is firming. 2. New orders situation is improving. 3. Construction awards are rising.

Depreciation reform fails in 85th Congress. STEEL points to apathy of Congress and industry, lack of industry leadership, and failure to inform congressmen.

Proposed program for nonferrous metals sets limits on subsidy payments, gives the administration indirect control over domestic output.

Autoworkers are supporting Walter Reuther's program. Stand-fast policy of automakers seems to have backfired.

Sen. Homer Capehart (R., Ind.) fails to get expected support from businessmen for his depreciation reform measure.

President Eisenhower's proposal for a civilian space agency, National Aeronautics & Space Administration, O.K.'d unanimously by the House. It is expected to pass the Senate easily.

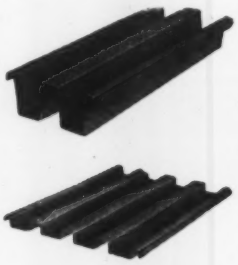
Steel production hits peak for year as furnaces reach 60.4 per cent of capacity.

House votes to extend corporate taxes at 52 per cent rate and excise taxes under a "no amendment" rule.

Scrap exports are about one-third below record 1957.

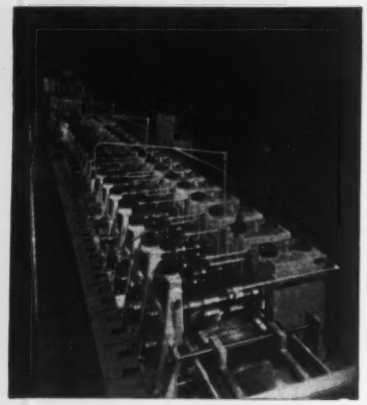
Custom smelters boost copper prices eighth time in three weeks

Steel Roof Decks and Flooring cold rolled up to 200 f.p.m. on this mammoth



AMERICAN ROLLER DIE CORP
ARDCOR

ROLL FORMING MACHINE



ARDCOR Roll Forming Machines feature: Unit Design—spindles in self-contained SEPARATE HOUSINGS, with speed reducers; Large Range of Vertical Centers; Double Bearing Design of Drive Housings; All Bearings are Anti-Friction; Micrometer Type Dials and Scales.

This entire automated production line is 15 ft. wide, 6 ft. high and 120 ft. long with total equipment weighing approximately 175 tons. Mill stands are completely movable, having 4½ in. dia. spindles with 42 in. roll space.

Fed by 20,000 lb. steel coils, the twenty-two roll passes form the 1½ in. deep by 2 ft. wide sections. The mill operator controls the loading, lining-up and feeding of the coil stock from a control bridge at entry of the mill. A 150 ton Straight Sided ARDCOR Press cuts off sections to proper lengths.

ARDCOR Roll Forming Machines, are available in six standard sizes, other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and construction to produce them better . . . at greater speeds and profit!

Consult our Engineering Facilities, without obligation . . .

American **ROLLER DIE CORP.**
29520 Clayton Avenue **Wickliffe, Ohio**

ARDCOR Engineered MEANS BETTER COLD ROLL FORMING

DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock-Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

on June 11. The quotation, 26 cents a pound, is 1 cent a pound over primary producers' level.

Twelve unions representing 2000 employees at Ford, Chrysler, and GM agree to a two year contract extension.

Passage of House labor laws dim because nearly 40 per cent of House members are openly prolabor.

Canmakers appear to be recession proof. Production is expected to be 3 billion cans over '57's.

Anaconda Co. boosts price of copper 1.5 cents (to 26.5 cents a pound) on June 17. It's the first advance in primary since 1956.

Alan Wood Steel Co. is the first to raise steel prices ($6 per ton) effective July 7, but it rescinds the move when no one follows.

Leo Hoegh, federal civil defense administrator, heads new Office of Defense & Civilian Mobilization which replaces old FCDA and Office of Defense Mobilization.

Alcoa will begin aluminum production on two new potlines this fall at Massena, N. Y.

Republic Steel Corp. opens $18 million bar mill at its South Chicago plant. A new pipe mill will complete J&L's ten year, $200 million expansion program at Aliquippa, Pa.

Chevrolet releases orders for air-cooled aluminum engine. American Motors and Willys get military contracts to produce Jeeplike vehicles with aluminum engines.

July

Alaska becomes 49th state.

Steelmakers get automatic 20-cent boost in wages and fringes.

Aircraft company backlog is $200 million below that of 1957's first quarter as transition is being made to Space Age.

Air Force to spend $943 million in fiscal 1959 on major ground support items for surface to air missiles, estimates Aircraft Industries Association.

John McCrone, new AEC chairman, takes reins as Adm. Lewis L. Strauss departs.

Congress orders permanent status for Small Business Administration.

Senate passes Seaton Bill for domestic minerals stabilization.

Most major steel producers raise sheet and strip products $3 to $7 per ton.

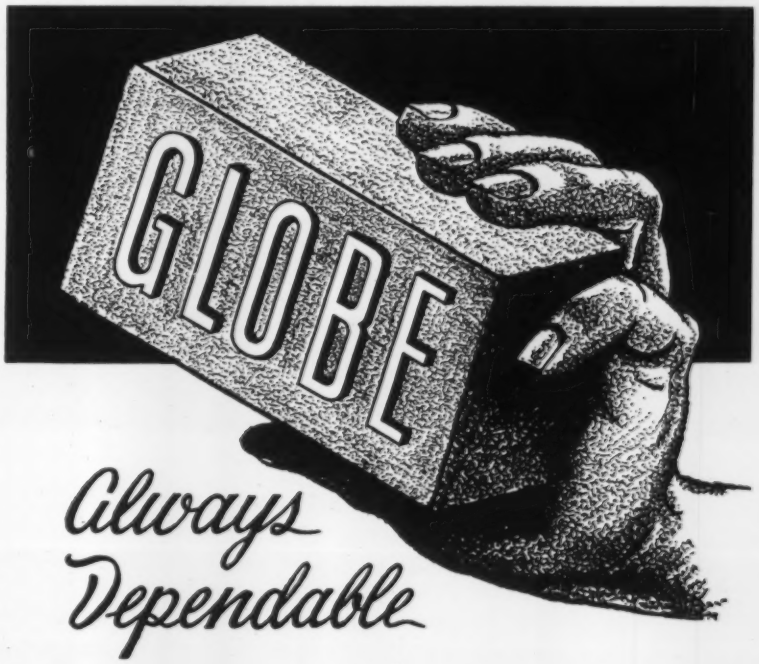
Summer business level stays above recession low.

Average first half earnings for reporting steel companies off over 50 per cent.

Congressional approval given to National Aeronautics & Space Administration.

August

GE to start negotiating nonwage Union matters with IUE Sept. 2.



SUPERIOR LADLE BRICK

The greater heat resistance of GLOBE brick is well known in the steel industry. Because these bricks, wire cut or dry pressed, last longer—saving much time lost in refractory replacement—they help increase melting capacity. There is a type for every need, so let us place our experience at your disposal.

Lowers Per Ton Cost and Increases Melting Capacity

SERVING THE STEEL INDUSTRY SINCE 1873

The GLOBE BRICK Co.
EAST LIVERPOOL, OHIO

demands Guaranteed Annual Wage for third time.

Lake Carriers Association opposes charges on Great Lakes vessels using Welland Canal. Tolls for seaway users not contested.

Steel buyers end inventory cutbacks. User stockpiles near two-month level.

Big Three automakers risk a strike by standing pat with offer to extend present Autoworkers contract.

National ingot rate holds at 59 per cent of capacity.

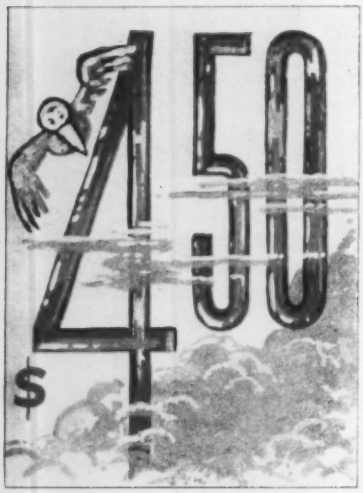
Don Rarick, presidential opponent of David J. McDonald, United Steelworker president, is still active. Anti-McDonald slates win several major union elections at local level. Much politicking expected at Steelworkers' convention.

Farm equipment, hit by the recession long before other segments of metalworking, is pulling out of the slump in a big way.

Prices of structural steel for federal highways have dropped 13 per cent in the last year.

U. S. Steel Export Co. advances prices on Aug. 12.

Nuclear subs *Nautilus* and *Skate* make historical runs beneath North Pole.



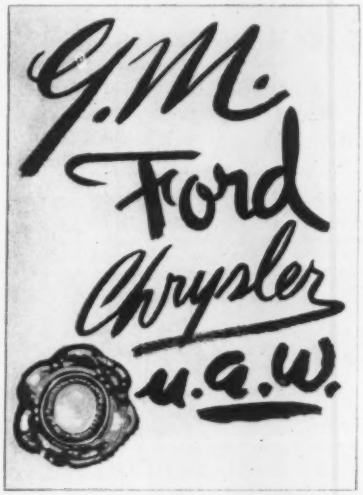
Steel prices are increased $4.50 per ton. In spite of hikes, demand picks up.

European Economic Community (West Germany, Italy, Netherlands, Belgium, and Luxembourg) set up to achieve economic integration.

Construction industry replaces autodom as top consumer of mill steel shipments in 1958. Construction demands bolster steel's recovery.

Wildcat strikes break out at Big Three plants as contract negotiations falter—although strikes are at ten year low nationally.

September



UAW-Big Three contracts signed. They are basically what management offered the unions last June.

Secretary Seaton's nonferrous metal bill is killed in closing sessions of Congress. It'll probably be reintroduced in different, more acceptable form at next session.

James J. Nance resigns as vice president and general manager of Ford's M-E-L Div., Dearborn, Mich. He is succeeded by Ben D. Mills, formerly head of the Lincoln Div., and most recently general manager of the M-E-L Div.

Steel ingot production hits 1958 peak of 1,751,000 tons (65 per cent of capacity).

Business failures hit two year low.

Production goal for steel ingots and castings in 1959 set at 110 million tons.

STEEL's scrap composite hits highest point since Sept. 27, 1957, rising to $43 per ton.

David J. McDonald, Steelworkers' president, asserts power at union's convention in Philadelphia. Group passes resolution to expel Don Rarick and backers from union if they continue to be difficult.

Automakers predict 5.5 million car sales in 1959.

U. S. Steel starts construction of a new blooming and structural mill at its South Works, South Chicago, Ill.

Base prices on tin plate go up to 25 to 35 cents per box Nov. 1.

Government establishes quotas to limit lead, zinc imports.

October

Railroads serving eight midwestern states will cut freight rates 3 to 35 cents on iron and steel products (excluding scrap) on Oct. 15.

Chrysler wins two important concessions in its new contract: Elimination of the Briggs contract by December, 1959, and tighter wildcat strike provisions.

Machine tool builders help to bridge recession by soliciting rebuilding jobs.

Steel employment costs reached new high of $104.56 per week in 1957's second half, AISI reveals.

Lead price advanced to 11.5 cents per pound as import limitations strengthen market.

Minneapolis, St. Paul & Sault Ste. Marie and New York Central offer preferred rates to shippers, regardless of size, who guarantee the roads a certain percentage of their business.

GM and Chrysler production hampered by strikes over local grievances.

Bureau of Public Roads reports road program finally approaching dimensions charted by planners in 1956. But it faces a shortage of funds. Several fund raising alternatives have been presented.

Studebaker-Packard Corp. introduces the Lark, an economy car. It's viewed as company's last chance. Initial response is encouraging.

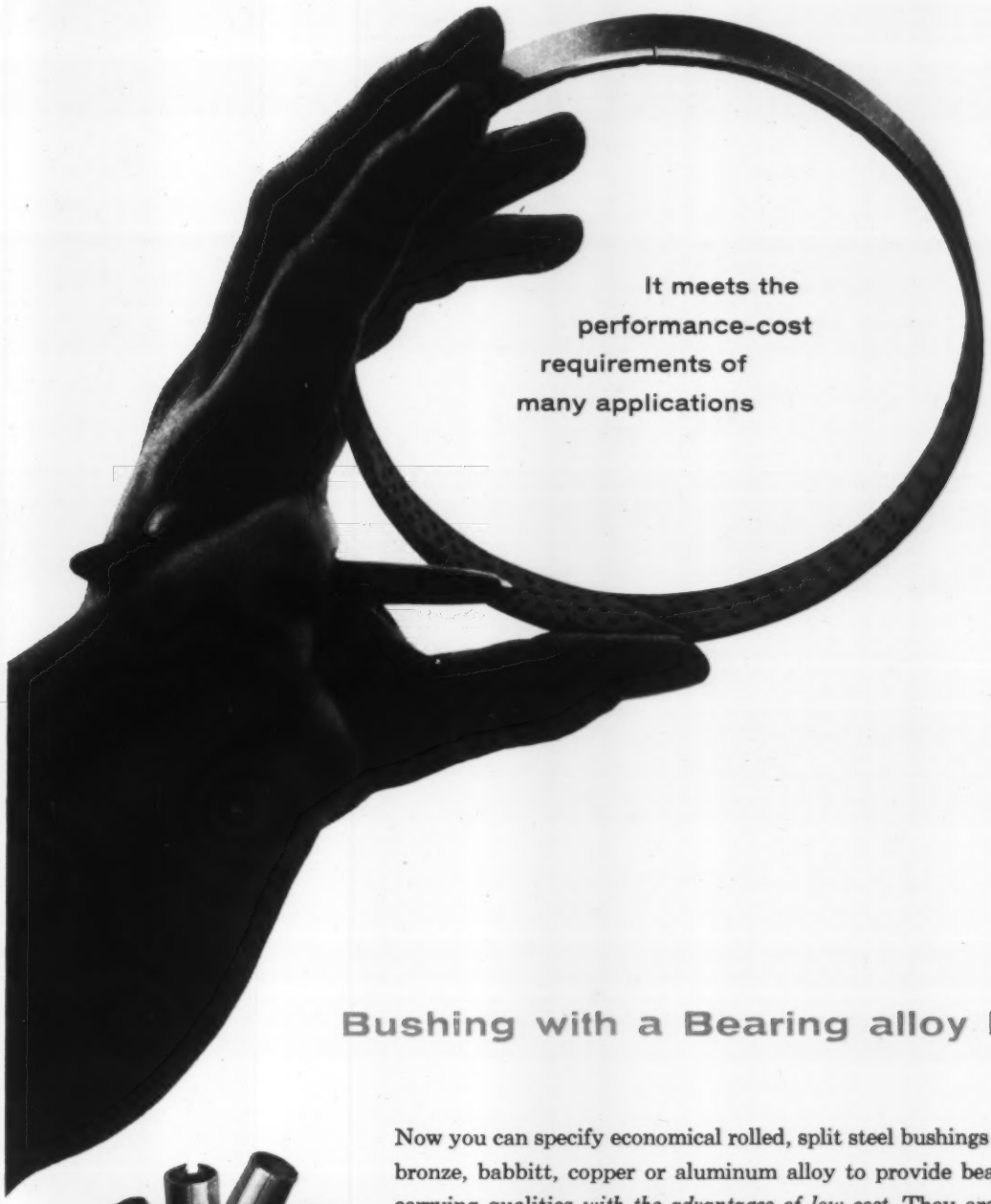
The 1959 autos are slow to reach highways because of widespread strikes in the automaking industry.

Wave of nonferrous price fluctuations slows down as zinc and lead hold; copper rises to 29 cents, a 1.5 cent increase, on Oct. 23.

Westinghouse, GE buck SUB trend as they sell employees on savings plan, hope independent unions will want to embarrass IUE President James B. Carey.

Ingot rate reaches 75 per cent of capacity, high for the year.

Reynolds Metals Co. unveils the



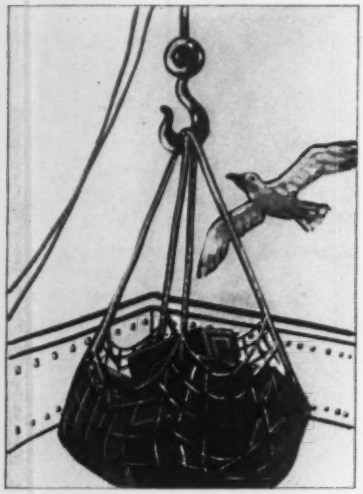
Bushing with a Bearing alloy lining

Now you can specify economical rolled, split steel bushings lined with bronze, babbitt, copper or aluminum alloy to provide bearing load-carrying qualities *with the advantages of low cost.* They are available in many lengths and diameters, with straight, clinch, butt or special seams. They can be ball indented and have oil holes, grooves, notches, slots, as required. Quality controlled manufacturing to meet your specifications. We provide complete engineering service. A copy of the "Formed Bushing Design Guide" will be sent on request.

FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11051 SHOEMAKER, DETROIT 13, MICHIGAN

Reynolds-Baroni bridge, made of aluminum. It's designed to compete with steel in the highway program.



Imports continue to rise as foreign producers cash in on low costs.

November

Structural steel bookings exceed expectations by 400,000 tons. Year's total will be about 2,650,000 tons. In first half, government work accounted for 45 per cent of bookings.

Dynapak, a method of explosive forming, is introduced by Convair, a division of General Dynamics Corp. It's one of the hottest ideas to hit metalworking in a long time.

Adm. Lewis E. Strauss, former AEC chairman, becomes Commerce Department head Nov. 10.

This will be one of the poorest years for the scrap industry since the thirties, says Myron L. Chase, president, Institute of Scrap Iron & Steel Inc.

Steel inventory buildup begins.

Substantial price reductions on titanium sponge, billet, and bar products made by Mallory-Sharon Metals Corp., Niles, Ohio.

West Germany passes the U. S. as the Free World's leading machine tool producer ($630 million, vs. $480 million in U. S. values).

Youngstown Sheet & Tube will spend $50 million to revamp Campbell (Ohio) strip mill. It'll take two years.

Nick Mamula, one of Don Rarick's followers in the revolt against steelworker prexy David J. McDonald is charged with "dual" unionism. He will be tried by the union. Similar action against other rebels is expected.

J&L extends expansion program to include 59 new Wilputte coke ovens at Pittsburgh, improved facilities at Cleveland, and a warehouse at Atlanta.

Ore shipping season closes earlier than usual on Nov. 28. Shipments total about 90 million gross tons.

Revamped barter programs developed by Department of Agriculture. Twenty-six minerals (including lead and zinc) are now eligible for barter contracts.

Right-To-Work succeeds in only one state, Kansas. Six states vote on it.

Judge Weinfeld rules against Bethlehem Steel Corp.-Youngstown Sheet & Tube Co. merger. He contends move would eliminate major producer from steel competition.

December

World steel output for year totals 294.7 million tons, vs. 322.1 million in 1957.

Pentagon starts to cut back, stretch, and cancel to meet defense budget. The Navy will end its Seamaster program with delivery of 14 instead 24 jets. Titan ICBM, Nike Hercules, Bomarc, and Talos are likely candidates for cuts or cancellations.

Strike-plagued automotive industry finally gets into sizable production, though work stoppages keep it below year ago levels.

Kaiser Aluminum & Chemical Sales Inc. shows the Pele, an all-aluminum car, in Detroit.

Steel inventories expected to reach 14 million tons by the end of year.

Fourth quarter shapes up as best of year.

Four U. S. wire producers file with the Tariff Commission for an investigation of damage being done to their industry by imports.

Decentralization by the Big Three and competition from captive and foreign producers create squeeze on Detroit tool and die shops.

United Mine Workers win $2 a day wage increase—$1.20 on Jan. 1, 80 cents on Apr. 1.

Renegotiation Act expected to be extended to June 30, 1962. Chance for reform is slipping.

Ferroalloy sales are expected to be about 80 per cent of 1957's.

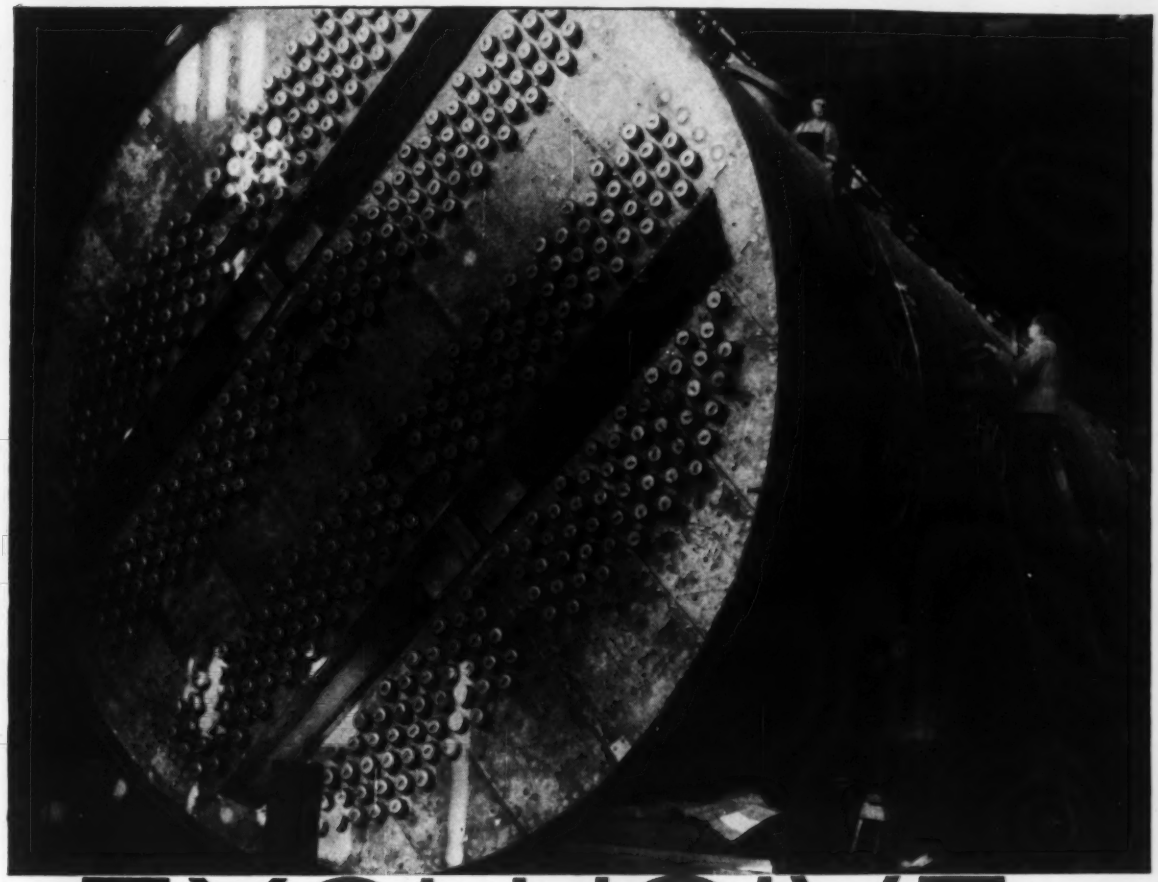
Structural aluminum will compete with steel. Although it accounts for less than 5 per cent of all aluminum sales, the potential is great.

Right-To-Work proponents change tactics. Laws will be pushed in nonindustrial states in anticipation of great influx of industry into such regions.

Scrap people present problems facing their industry before Office of Civil & Defense Mobilization. Spokesmen request essentiality rating for the industry and minimum rate supports.

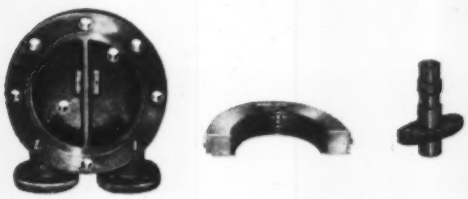
Supreme Court reverses Memphis decision of November, 1957. It means gas companies can raise rates without the consent of all consumers. Decision hailed as boon to gas industry expansion.

Red China doubles steel production in 1958.



EXCLUSIVE...

At Sun Ship, STAINLESS STEEL is synonymous with EXCLUSIVE, because Stainless is never exposed to contamination by fabrication with ordinary carbon steel tools.



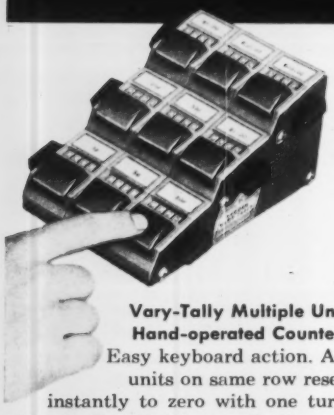
Working with the 300 to 400 series of alloys, clad steel, aluminum and other alloys, Sun fabricates pressure vessels, tanks, towers, troughs, autoclaves, reactors, hoppers, platework and machinery in all sizes and types. Each to exact specifications. Each with an additional quality feature... EXCLUSIVE.

SUN SHIP
BUILDING & DRY DOCK CO.
CHESTER, PENNSYLVANIA

How do you Know ...unless you COUNT?

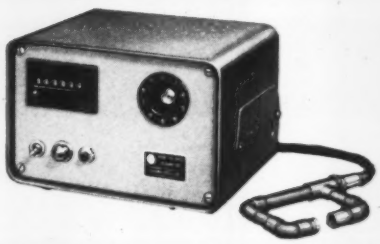
All that paperwork can mean less than nothing . . . unless it's based on up-to-the-minute "facts in figures". Figures on production and processing that prevent errors, delays, shortages, over-runs . . . that indicate maintenance and replacement needs . . . that improve work scheduling and quality control . . . and give workers a fair basis for wage and incentive payments. What's more, *built into your products*, Veeder-Root Counters will give you a new sales pitch . . . even prove your product's guarantee in service. Yes, you can count on Veeder-Root *Count*rol in countless ways . . . *to your profit*. Let us show you how. Write:

You always "Know the score" when you count on Veeder-Root!



Vary-Tally Multiple Unit Hand-operated Counter. Easy keyboard action. All units on same row reset instantly to zero with one turn of knob. Supplied in practically any number of units, in any arrangement.

New High-Speed Predetermining Counter, Series 1522, features instant lever reset plus quick and easy setting of predetermined number. Speeds up to 6,000 rpm. Also supplied without predetermining feature.



New "Count-Pak", a complete electronic counting package for use where high speed, long life and instant reset are required. Rated at 20,000 counts per minute (with added decade speeds run up to 200,000 cpm). *Completely transistorized.* Photohead adaptable to any job. Several other "Count-Paks" available.

Everyone can Count on **Veeder-Root Inc.**

HARTFORD 2, CONNECTICUT

Hartford, Conn. • Greenville, S. C. • Altoona, Pa. • Chicago
New York • Los Angeles • San Francisco • Montreal
Offices and Agents in Principal Cities

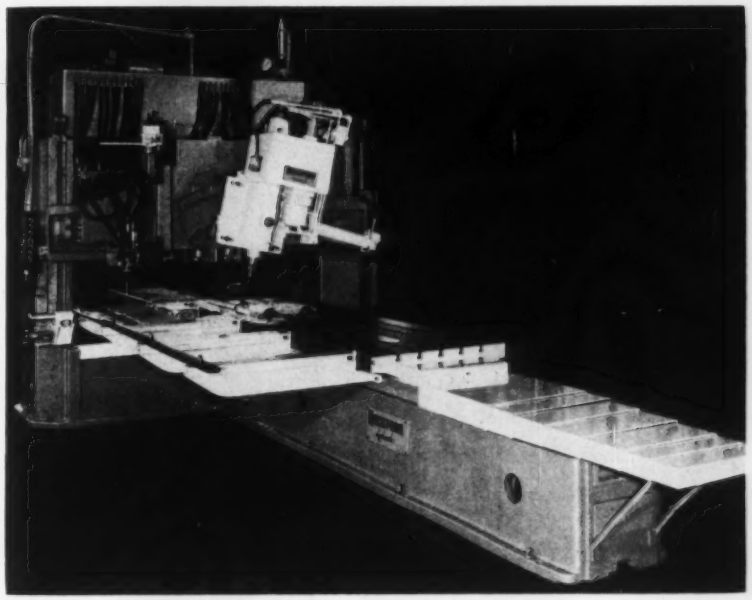
Swarfing Mill Machines Compound Surfaces

THIS machine is designed to meet the rigid requirements of the aircraft industry. Called the Hy-Draulic 3-D swarfing mill, it machines the joining edges of parts or subassemblies that have compound surfaces.

It combines the versatility and efficiency of hydraulic drive with the ease of manual stylus control.

Longitudinal, transverse, and vertical movements are transferred from full sized wood, plaster, plastic, or metal templates to the milling cutter by manual stylus control. This enables the operator to keep the milling cutter in full view and to have complete control of the feed rate at all times.

Sizes: 30 x 24 in., 36 x 24 in., and 42 x 24 in., with stroke lengths of 6, 8, 10, or 12 ft. For more information, *write* Dept. 213, Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.



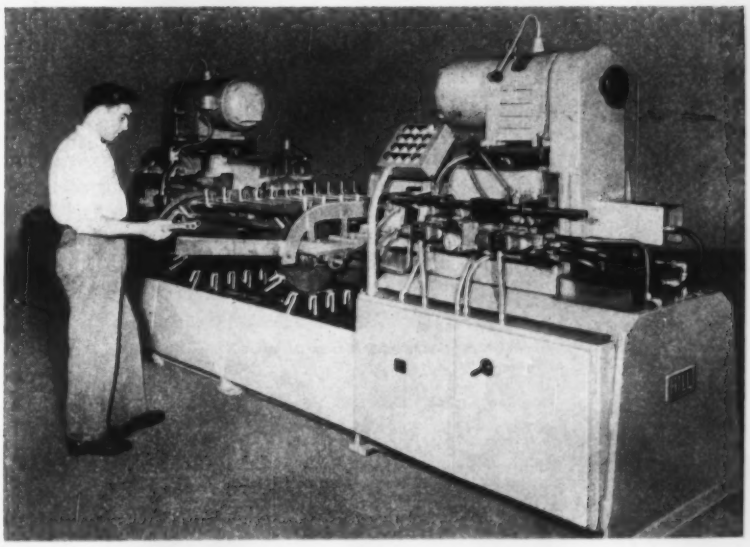
Transfer Machine Speeds Bar End Operations

HERE's an automatic, double-end transfer machine that can cycle at 3600 pieces an hour. It does six forming or cutting operations on each end of tubular or solid round stock up to 2 in. in diameter.

Operations include milling, centering, boring, threading, deburring, cutoff, spinning, flaring, forming, and dedimpling on ferrous and nonferrous parts.

Stock is fed to the machine conveyor; a transfer mechanism carries it through the machining or forming stations and deposits it on an exit conveyor or tote box.

In a typical operation, tubing for electrical conduit (1 to 2 in. in diameter, 10 ft long) is located endwise for clamping in the first station, cut to length in the second, dedimpled in the third, and deburred



FOR BIG POWER use Maxi-Power

PARALLEL SHAFT HELICAL GEAR DRIVES

1. Heavy duty, reinforced design housing for permanent alignment, rigid shaft support.
2. One mesh per reduction—fewer moving parts.
3. Broad faced helical gearing—high quality, accurately hobbed for greater strength, durability. Uniform tooth deflection under load . . . no uneven wear.
4. Shafts firmly held in place. Positive gear location assures full tooth engagement across entire face.
5. Smooth, overlapping mesh, close backlash tolerances, no oil trap, provide quiet operation, less heat generation.
6. Heavy duty, anti-friction bearings. Conservatively rated for wide range of operation.

Capacities to 1550 H.P.

★ Single, Double, Triple Reductions
★ Standard Ratios from 2.08 to 1 up to 360 to 1
★ 9 Shaft Arrangements
★ Available With Fabricated Steel Housing

There's more capacity, greater stamina and longer service life built into Foote Bros. Maxi-Power Parallel Shaft Drives. Simple, balanced design, fewer moving parts, heavy duty construction, efficient lubrication and conservative ratings make Maxi-Power drives the logical choice for critical applications and severest operating conditions.

You can depend on Maxi-Power Drives to produce maximum performance with minimum attention because they're built for just that kind of service.

Write for Engineering Manual MPB . . . has complete details and data. There's no obligation!

100 YEARS SERVING INDUSTRY 1859-1959

FOOTE BROS.

Better Power Transmission Through Better Gears

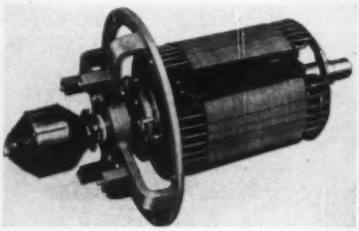
FOOTE BROS. GEAR AND MACHINE CORPORATION
4583 SOUTH WESTERN BOULEVARD • CHICAGO 9, ILLINOIS

on the inside and outside in the fourth. Production: 1200 pieces an hour.

For more information, *write* Walter P. Hill Inc., 22183 Telegraph Rd., Detroit 19, Mich.

Brushless Generators Are Free of Sparking

HERE's a generator that can be used in hazardous, dusty, or abrasive atmospheres. Because it has no brushes, commutator, or slip rings, it requires practically no maintenance and eliminates sparking dangers.



High power silicon rectifiers make this development possible. Six rectifiers are mounted on a ring which rotates with the generator rotor. An alternating current exciter furnishes current to the rectifiers which, in turn, supply direct current for the generator field.

The units are available in ratings of 6.25 to 187 kva over a broad voltage range. For more information, *write* Electric Machinery Mfg. Co., Minneapolis 13, Minn.

Mobile Coolant Blender Is Maintenance-Free

IF YOU use water-soluble coolants mixed in ratios of 10:1 to 100:1, you can blend and dispense them from a portable unit made by the M. J. French Co.

One control handle varies the ratio of water and coolant. Designed as a one man unit, the maintenance-free blender uses two positive displacement pumps linked to metering valves to allow the infinite selection of coolant mixes.

A 75 gallon water tank and 5 gallon oil container on the unit are generally sufficient to make up

or fill a line of machines. You can install the unit permanently.

For more information, *write* M. J. French Co. Inc., P. O. Box 23, Brighton Station, Rochester 10, N. Y.

Hoists Extend Range

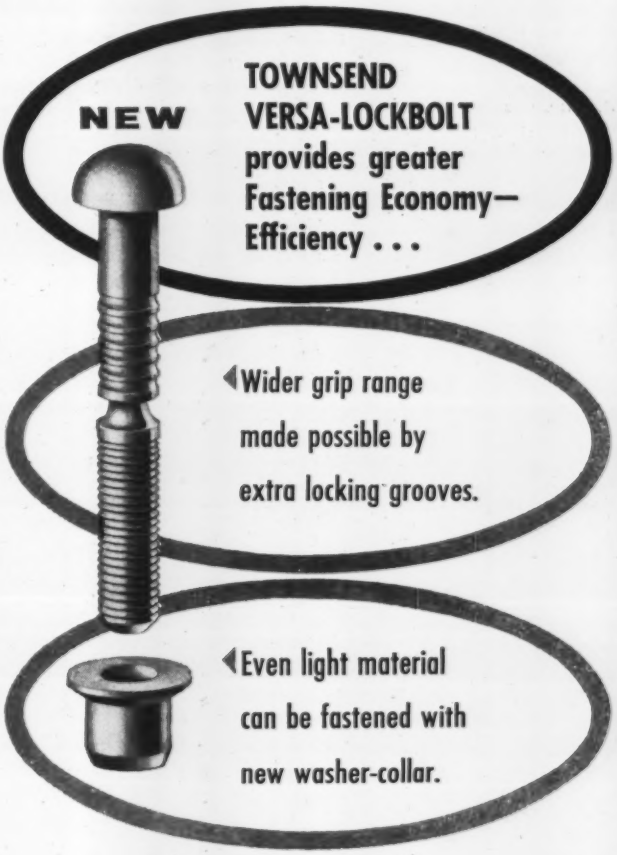
Three models of the CM Loadstar electric hoist extend the capacity range to 2 tons and double the lifting speeds in the ½ and 1 ton sizes.

The Model R has a capacity of 2 tons and lifting speed of 8 fpm, the Model L a 1-ton capacity at 16 fpm, and the Model J a ½-ton capacity at 32 fpm. *Write*: Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp., Tonawanda, N. Y. *Phone*: Jackson 2230

Automatic Ramp Is Activated by Truck

TO BRIDGE the gap between your loading dock and trucks, consider an automatic ramp introduced by American Dockbridge. It offers increased safety, reduced handling time and costs, and a more efficient flow of materials during loading and unloading.

When not in use, the ramp is level with the dock floor, making full crosstraffic possible. Hinged at the rear edge, the unit is activated when a truck backs into a push



The new Townsend Versa-Lockbolt* is an improved, yet more economical type. Design changes have increased the grip range of the fasteners and made it feasible to use them in relatively oversized holes. They are more economical to manufacture and the savings are passed on to you.

The high tensile pre-load values and positive locking action which have made lockbolted joints absolutely vibration-proof in the past are also provided by the Versa-Lockbolts. The new flanged integral washer-collars make Versa-Lockbolts especially suitable for fastening even light gage materials.

The wider grip ranges provided by additional locking grooves in the Versa-Lockbolt permit a reduction in the sizes stocked, reducing inventory costs and increasing production line flexibility. Installation inspection is reduced, since hole sizes are less critical. These savings, plus the lower cost of the fasteners made Versa-Lockbolts a truly economical method of vibration-proof fastening.

For full information, write Townsend Company, P. O. Box 237-C, New Brighton, Pa.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049 and 2,754,703

The Fastening Authority

Townsend

COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry Rivet Division • Santa Ana, California

frame in front. The elevating mechanism raises the front of the ramp to maximum height (16 in. above dock level) where it stops. As the truck continues backing, the ramp lowers until it rests on the back of the truck bed.

The dockbridge is available in 6, 8, and 10 ft lengths. Prices start at $695. For more information, *write* American Dockbridge Inc., 235 W. Oklahoma Ave., Milwaukee 7, Wis.

Radiotelephone Speeds Intraplant Handling

YOU CAN speed material handling in and around your plant by installing the Kaar TR325 mobile radiotelephone on your lift trucks and other handling vehicles.

Effective for about 5 miles, the two-way radio unit has been accepted by the FCC for licensing as a Class D radio station in the high frequency Citizens Band, 26.965 to 27.225 megacycles.

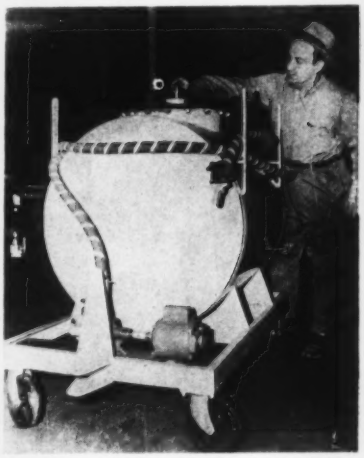
The TR325 can be operated from a 6 or 12 volt battery, or from 117 volts, ac. The price ($360) includes a hand microphone, a base loaded whip antenna, cables, and a shock mount. It can be used with an external speaker as a mobile paging system.

For more information, *write* Kaar Engineering Corp., 2995 Middlefield Rd., Palo Alto, Calif.

Unit Handles Acid

This acid transportation buggy has acidproof accessories. It moves acid safely.

The unit's steel tank is lined with rubber 3/16 in. thick. It is equipped



with a 35 gpm all-rubber, centrifugal pump with carbon seal; 1/3-hp motor; and an acidproof hose. *Write*: Perma-Line Rubber Products Corp., 1755 N. Winnebago Ave., Chicago 47, Ill. *Phone*: Humboldt 9-2020

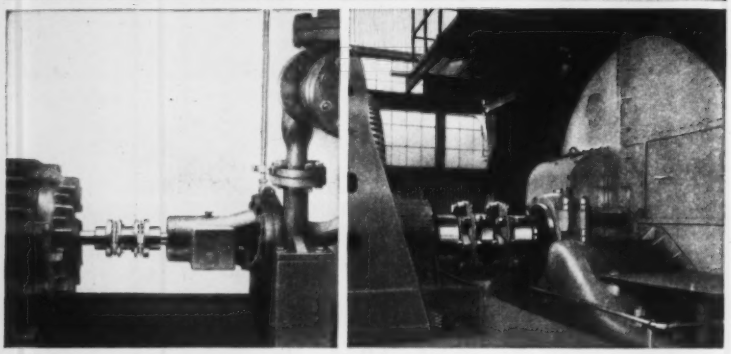
Chemicals Remove Rust, Prevent Corrosion

TWO NEW compounds promise to make metal surface preparation easier.

Metclene is a compound that dissolves rust chemically and forms a rust resistant, nonmetallic surface. It can be applied by brush, spray, or dip. The manufacturer says that it provides a firm anchor for paints, lacquers, and enamels and prevents peeling.

Rustend is a special petroleum oil containing rust inhibitors and moisture repellents. A cationic molecular film protects steel, brass, and

Protect your PUMPS and other Indispensable MACHINERY with THOMAS FLEXIBLE COUPLINGS



NO LUBRICATION NO MAINTENANCE NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

- Freedom from Backlash
- Torsional Rigidity
- Free End Float
- Smooth Continuous Drive with Constant Rotational Velocity
- Visual Inspection While in Operation
- Original Balance for Life
- No Lubrication
- No Wearing Parts
- No Maintenance

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

aluminum from rust and water spotting. Steel treated with the compound has withstood 1600 hours of salt spray testing.

For more information, *write* Biofen Laboratories, 14 Sixth St., Bridgeport, Conn.

Speedy Bench Presses Have Tonnage Control

TWO bench presses introduced by Hannifin Co. will do those high speed forming, trimming, and force-fit assembly operations that require 6 to 8 tons of pressure.

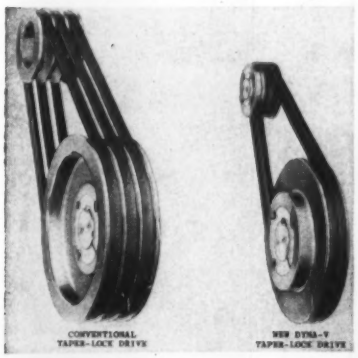
Tonnage is adjustable from 10 per cent of capacity to rated pressure. The return stroke is adjustable so you can shorten the work cycle to where the ram just clears the work-piece on repetitive operations.

Dual hand and adjustable down-stroke controls are standard. Electric pushbutton control with or without pressure reversal is optional. For more information, *write* Hannifin Co., division of Parker-Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.

Drives Feature Smaller Sheaves and V-Belts

THE NEXT V-belt drive you install may be the smallest you've ever used for the job. Reasons: Stronger metals for sheaves and synthetic rubbers and fibers for belts.

Called Dyna-V, the new line of drives covers the complete range of horsepower capacities available in conventional drives. The manufacturer says the majority of industrial drives can be handled with belts only ⅜ in. wide.



Dyna-V drives come in three sizes: The 3V model (⅜ in. belt) has sheaves with one to ten grooves for horsepowers of 1 to 50; the 5V series (⅝ in. belt) includes sheaves with three to ten grooves to handle up to 200 hp. An 8V series (1 in. belts) handles up to 1500 hp.

Taper-Lock bushings for quick mounting on the shafts are a standard feature of the sheaves. Belts have a crowned top and concave sidewalls for maximum efficiency.

For more information, *write* Dodge Mfg. Corp., Mishawaka, Ind.

Attachment Converts Crane to Lift Truck

THIS Stack-or-Lift accessory makes your mobile hydraulic crane do the work of overhead cranes and lift trucks where those machines are not economical for general purpose lifting, stacking, and transporting.

The accessory can be attached or removed in a few minutes. Fork widths will adjust to fit most pallets; platform attachments for handling loose materials are optional.

Suggested safety limits: ½ ton

Take a buyer's critical look at your zinc plated parts. Do they have the sparkle and brilliance that reflect their real quality? A high-grade finish may well provide the competitive edge which helps sell your product.

Leading manufacturers of everything from TV antennas to nuts and bolts have found these ROHCO® Zinc Brighteners provide the superior finish they are looking for:

ROHCO 503 STILL AND AUTOMATIC ZINC BRIGHTENER
ROHCO 100 BARREL ZINC BRIGHTENER
ROHCO 175 BARREL ZINC BRIGHTENER

The cost? Insignificant! Studies have shown that the difference between an ordinary finish and a full-bright ROHCO finish amounts to *less than ½% of plating costs!*

Don't let an ordinary finish downgrade your products' quality in today's competitive markets. A nearby ROHCO Technical Representative will be pleased to help you improve your finish, without obligation. Write us.

ROHCO

Nationwide Stockpoints

R. O. HULL & COMPANY, INC.
1309 Parsons Court — Rocky River 16, Ohio

DETREX PERM-A-CLOR NA*
cleans practically everything

Intricate or simple, small or bulky—if your product requires degreasing, DETREX PERM-A-CLOR NA is your assurance of cleaner cleaning. This premium grade solvent's unequalled combination of economy, safety, stability and cleaning ability has established it as standard in thousands of varied installations.

Should your production line require other metal cleaning or processing materials—or the machines and technical assistance to provide you with the greatest efficiency—DETREX can supply the exact combination to do the job for the lowest possible cost.

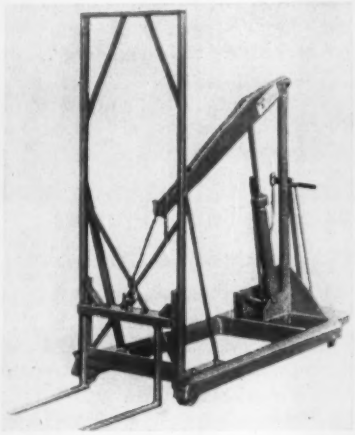
PERM-A-CLOR NA
(trichlorethylene)
Solvent Degreasers
Ultrasonic Equipment
Industrial Washers
Phosphate Coating Compounds
PAINTBOND Compounds
Rust Proofing Materials
Alkali and Emulsion Cleaners
Extrusion and Drawing Compounds
Spray Booth Compounds
Aluminum Treating Compounds

DETREX, pioneer in all phases of metal cleaning and processing, can save you money. Write today for full information.

*PERM-A-CLOR is registered trademark of

DETREX
Chemical Industries, Inc.
BOX 501, DEPT. S-158, DETROIT 32, MICH.

NEW PRODUCTS and equipment



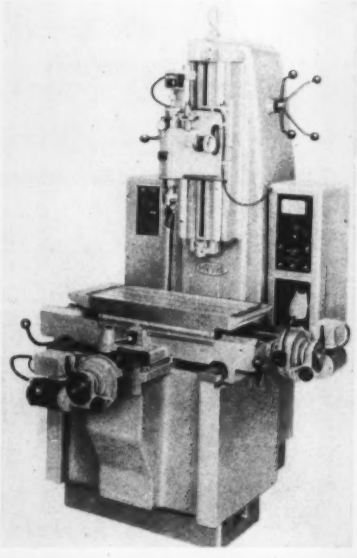
cranes, 350 lb; 1 ton cranes, 600 lb. The capacity of 1 ton models can be increased 60 per cent by adding a 150 lb counterweight.

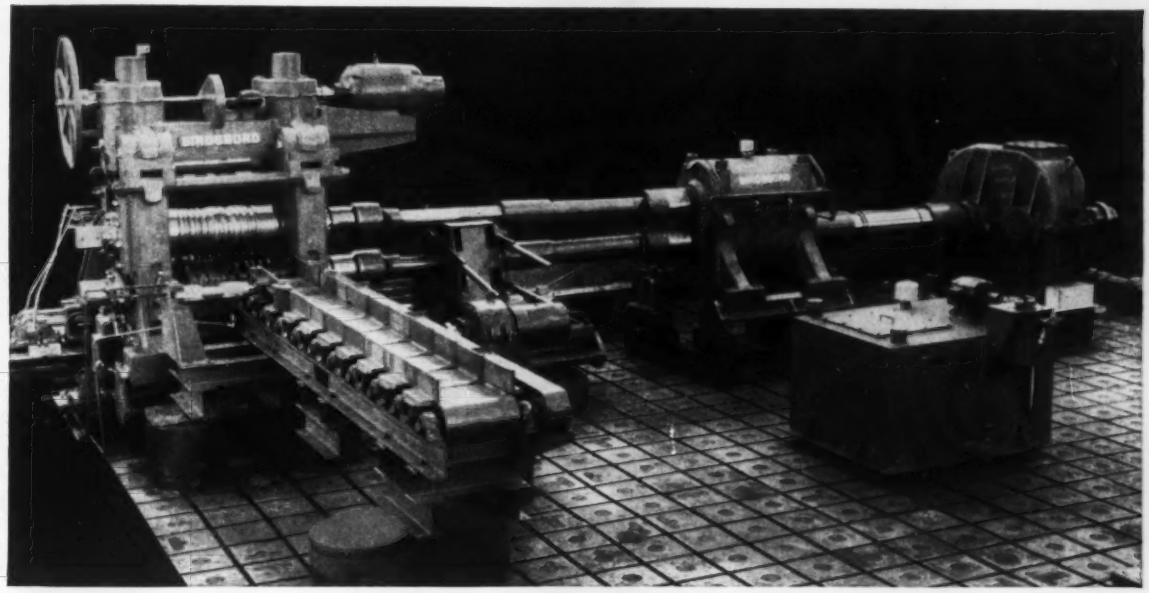
For more information, *write* Ruger Equipment Inc., 174 W. Fourth St., Uhrichsville, Ohio.

Measuring Machine Has Large Capacity

HERE is a measuring machine that checks large workpieces at labortory tolerances. It is capable of measuring to one-third of a ten-thousandth inch.

The machine has a work capacity of 11 x 18 x 18 in. It features motorized table positioning with accurate horizontal and cross lead





BIRDSBORO *hot mill to roll refractory metals at 3500° to 4000° in Universal-Cyclops' IN-FAB Facility*

Other important features

- A hydraulic system operates the auxiliary manipulators, the pinch rolls, the moving side guard and the mill stand transverse motion. It has an automatic oil lubrication system.
- Each new pass requires a transverse motion of the entire mill stand (the universal spindles are telescoping) in relation to the fixed material entry position on the table.
- The transverse mill stand motion is accomplished by a hydraulic cylinder remotely controlled from the pulpit with a potentiometer circuit.
- Purpose of the mill stand transverse motion is to eliminate costly manipulators and bar-turning devices which are needed in high production mills.

• This new combination 16″-14″ two-high reversing mill will roll refractory metal flats, squares and rounds in an inert atmosphere. Designed and built by Birdsboro, it can roll $2\frac{1}{2}$″ to $\frac{1}{2}$″ rounds and squares starting with 4″ x 4″ billets. The mill is 90% mechanized to reduce the number of men needed to operate it and to minimize production costs.

All rolling will be done automatically and controlled by an operator in a remote pulpit. The air is replaced by argon gas so Universal-Cyclops Steel Corporation can efficiently fabricate refractory metals at their best working temperatures. Employees will work in gas tight suits, entering the plant through an air lock.

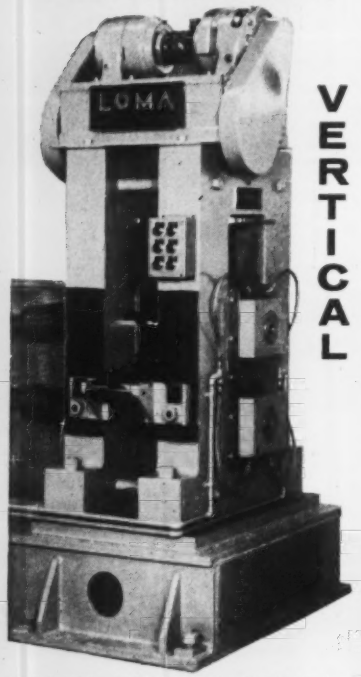
Birdsboro's custom-engineering of special machinery frequently adds the all-important creative element to mill machinery design and building. This creativity is proving to be worth profit dollars for Birdsboro customers. Contact your nearest Birdsboro representative or the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., *Main Office, Engineering Department and Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

B

BIRDSBORO
STEEL FOUNDRY AND MACHINE CO.

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel

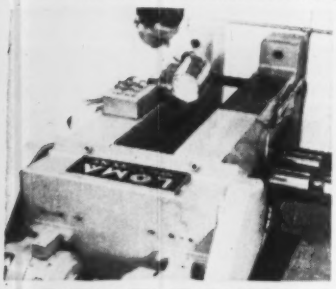
LOMA
COMBINATION MILL



VERTICAL

2½" & 8½" x 8" Four-High Setup for Strip Rolling

8½" x 8" Two-High Setup for Powder Metal Rolling



HORIZONTAL

The new LOMA Model 1000 Two-High/Four-High Combination Rolling Mill offers maximum versatility for both laboratory use and production application. With the rolls arranged in a vertical plane, the mill is employed for (a) hot or cold two-high breakdown rolling of flats and shapes; and (b) four-high cold finish rolling of sheet and strip. With the rolls arranged in a horizontal plane, the machine is used for the continuous compacting of powder metals into strip.

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

screws. The user has a choice of an electronic indicator supported on a rotatable spindle or a universal microscope for pickup.

The manufacturer offers a rotary table and a microsine table for accurate angular and compound angular settings. For more information. *write* Moore Special Tool Co. Inc., 800 Union Ave., Bridgeport 7, Conn.

Cleans Large Castings

A 6-ft Rotoblast Table-Room provides cleaning of work in foundries and plants that require a flexible machine for a wide range of cleaning operations.

It is capable of handling castings, forgings, and stampings to 72

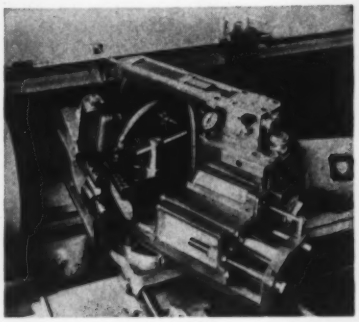
in. in diameter, 36 in. high, and weighing to 5000 lb.

The table is equipped with a sealing system that makes the cabinet abrasivetight without rubber gaskets. A single overhead wheel throws 50,000 lb of abrasive an hour. *Write*: Pangborn Corp., Hagerstown, Md.

Tracer Attachment Makes Lathes Automatic

YOU CAN convert lathes with up to 27½ in. swing for automatic multiple shaft turning, facing, turning, and boring contoured work with a new, self-contained, hydraulically operated tracer attachment.

The manufacturer says it will do the work of an automatic at a fraction of the cost. It is equally useful on production work, short runs, or one-of-a-kind maintenance and toolwork.



The unit mounts in place of the standard lathe compound slide and may be swiveled to any angle. Round or flat shapes in wood or metal may be used as templates, or you can use a standard workpiece.

Templates or prototype parts are mounted at the back of the lathe. Mounting brackets are available to fit any lathe without impairing the normal swing or traverse.

For more information, *write* Leland - Gifford Co., Worcester 1, Mass.

Moving Table Ups Output

YOUR assembly jobs can be speeded by a work bench with a built-in material flow line.

Available in various lengths and belt widths, the Table-Veyor units are also suitable for inspection, checking, sorting, testing, small order packing, and similar operations.

For more information, *write* Rapids-Standard Co. Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich.

Strapping Unit Makes 17 Ties a Minute

IF YOU'VE been hand strapping corrugated cartons, fiber cartons, and wooden cases, you'll want to look into this machine. It can make up to 17 ties a minute.

It automatically compensates the tension on the strap for variations in package size. Minimum package size it can handle is 4 in. high and 8 in. wide. You can strap packages up to 22 in. high and 20 in. wide, or 15 in. high and 26 in. wide.

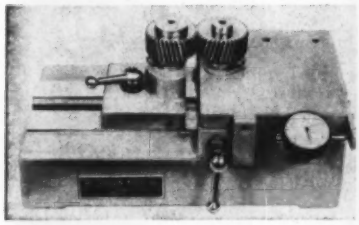
The machine uses either light or medium gage flat steel strapping. It forms the seals from a coil in the

machine and can make 7500 ties without reloading. For more information, *write* A. J. Gerrard & Co., 1950 Hawthorne Ave., Melrose Park, Ill.

Fixture Checks Size Meshing of Gears

HERE is a low cost, bench type rolling fixture for checking size, eccentricity, and meshing smoothness of spur and helical gears up to 10 in. in diameter. They are rolled against a master.

All deflections are shown on an integrated dial indicator in increments of 0.0005 in.



The precision bushing used on the master gear and part stud is replaceable. Master gear rotation can be in the bore of the master, or in the bushing—a feature that greatly extends the service life of the equipment.

The rolling fixture can be used with an automatic recorder to keep a record of the inspection on permanent charts. For more information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Transformer Gives You 110 Volts at Machine

WHEN you need 110 volts at machines or other stations where 220 or 440 volt sources are present, you can get it easily and safely with a compact transformer unit introduced by Mullenbach.

The unit can be bolted directly to machines or other equipment operating on the higher voltages. Since no external wiring is required, the transformer can be installed and serviced by the plant's regular maintenance crew.

For more information, *write* Mullenbach Div., Electric Machinery Mfg. Co., Los Angeles, Calif.

Horsepower Increased

Whitney-Tormag magnetic drives are available from stock in 3 and 5 hp units. They are self-contained power transfer units that provide motor and equipment protection from sudden starts, stops, and overloads.

They will run under full-stall conditions for extended periods without overheating or overloading the motor or driven machinery. *Write*: Whitney Chain Co., Hartford, Conn. *Phone*: Jackson 7-8261

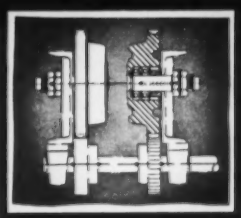
Heater Is Portable

A recirculating, oil fired, portable heater provides temporary heat for shops, warehouses, shipping platforms, or any unheated area. A thermostatic control insures against fuel waste.

The heater is useful in thawing out frozen equipment and material. Models are available in six sizes from 100,000 to 1,000,000 Btu an hour. *Write*: Stow Mfg. Co., 63 Shear St., Binghamton, N. Y. *Phone*: 3-6411

ABELL-HOWE
UNDERHUNG
CRANES
now with
FORGED ALLOY STEEL WHEELS, GEARS and PINIONS

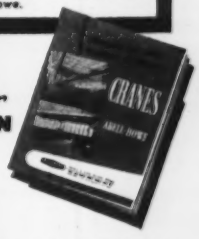
Only Abell-Howe offers you forged steel dependability at all critical points of wear —wheels, gears *and* pinions! Furthermore, Abell-Howe rugged outrigger construction keeps bridge in square—provides lateral bracing for bridge girder. Smooth fluid drive provides cushioned starts whatever the load—reduces reversing shocks. To further assure smooth operation and lasting service, anti-friction bearings used throughout—with double row ball bearings in end truck wheels. Here's crane value that can't be beat!



another ABELL-HOWE plus "QUICKLOCK" WHEEL ASSEMBLIES

Combine positive wheel mounting with immediate removability. To remove axle, simply loosen two nuts, twist axle 90° and pull it out. Wheels, too, are as easily removed with no dismantling of truck frame. "QUICKLOCK" is exclusive with Abell-Howe.

Ask for BULLETIN



ABELL-HOWE COMPANY 7757 W. Van Buren St., Forest Park, Illinois

NEW literature

Write directly to the company for a copy

Welding Wire Chart

Bulletin DH-1218-O compares Page welding wire with virtually all competitive makes. It details physical properties as welded, gives analyses, tensile strength, elongation, and average hardness. It also lists typical uses of gas welding rods, bare electrodes, automatic welding wire and metal spray wire. Page Steel & Wire Div., American Chain & Cable Co. Inc., Monessen, Pa.

Surface Grinding Machines

Two brochures give specifiactions on the new Brown & Sharpe 510 and 618 surface grinders. Accessories for the machines are also listed. Machine Tool Div., Brown & Sharpe Mfg. Co., Providence 1, R. I.

Tubular Products

A 14-page brochure gives specifications and characteristics of stainless, nickel alloys, and special metal tubing that ranges from hypodermic sizes up. J. Bishop & Co., Malvern, Pa.

Molybdenum in Steel Castings

The role of molybdenum in heat treated low alloy steel castings is the subject of a 36-page brochure. Discussed are hardenability, tensile properties, fatigue, wear, and impact resistance of cast steels. Climax Molybdenum, 500 Fifth Ave., New York 36, N. Y.

Iron Powder Information

Here is a 52-page book that contains complete technical data on Republic types cdf and MS iron powders. Most of the necessary information regarding a powder's behavior can be read from charts. Republic Steel Advertising Div., 1441 Republic Bldg., Cleveland 1, Ohio.

How To Fabricate Hastelloy

A 36-page booklet gives procedures for welding, forging, forming, machining, grinding, brazing, heat treating, descaling, and pickling the Hastelloys B, C, D, and F. Haynes Stellite Co., division of Union Carbide Corp., Kokomo, Ind.

Waste Treatment Product

Dowpac, a new plastic packing material used in the biological oxidation of liquid wastes, is discussed in a 32-page bulletin. It contains information on the material's properties, assembly instructions, and operational characteristics. Plastics Dept., Dow Chemical Co., Midland, Mich.

Stainless Buyers' Guide

Directed toward purchasing agents, designers, and fabricators, this 159-page book lists about 3000 firms which make stainless steel products or offer services. Manufacturers are listed under 188 specific and general product categories. Committee of Stainless Steel Producers, American Iron & Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Wrought Iron for Drainage

A 64-page booklet on wrought iron for building drainage systems is for architects, engineers, building owners, contractors, and maintenance supervisors. It discusses piping for soil, waste, vent, and downspout applications. A. M. Byers Co., P. O. Box 1076, Pittsburgh 30, Pa.

Data on Welding

The importance of ground current conduction when using welding positioners is discussed in a 13-page booklet. Aronson Machine Co., Arcade, New York.

Surface Equipment

Catalog 839 covers over 300 items. Included are semisteel and granite surface plates, angle plates, V-blocks, box parallels, straight edges, welding tables, and other equipment. Challenge Machinery Co., Grand Haven, Mich.

Strippable Vinyl Coats

A folder describes transparent, high tensile coatings that can be used to protect and moisture seal a variety of metallic and nonmetallic surfaces. The brochure suggests application techniques, stripping, and some of the uses for the product. Metal Processing Dept., Pennsalt Chemicals Corp., 3 Penn Center, Philadelphia 2, Pa.

Rubber-Metal Products

A line of bearings, bushings, couplings, mounts, sleeves, and molded shapes is described in a 12-page catalog. The rubber-metal parts are engineered to accept misalignment, isolate vibration, eliminate lubrication, and cushion shock loads. Dept. A, Clevite Harris Products Inc., Lockwood Rd., Milan, Ohio.

Zinc, Aluminum Coated Tubing

This 6-page folder (P. O. 5558) suggests design uses for special coated steel tubing, describes properties of Zincgrip and Aluminized Steel, types 1 and 2. A gage-decimal thickness conversion table is included. Armco Steel Corp., Product Information Service, Middletown, Ohio.

Insert Tool Holders

Catalog 581 describes a new line of throwaway insert tool holders that eliminates the necessity of a separate chip breaker. The design features a top clamp that is carbide hard faced. Throwaway inserts of carbide, cast alloy, oxide, and high speed steel are also described. Viking Tool Co., 1000 Nichols Rd., Shelton, Conn.

Metal-Clad Switchgear

A 24-page bulletin describes a line of metal-clad switchgear which includes indoor and walk-in outdoor equipment with ratings through 3000 amperes continuous and 350 mva interrupting capacities. Ask for Bulletin 2804-1A. I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.

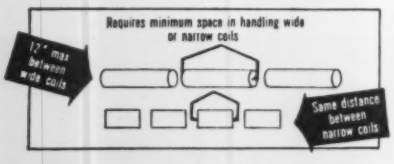
Handling Coil Stock?

CHECK THESE

C-F LIFTER ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles – a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.



CULLEN-FRIESTEDT CO.

1308 South Kilbourn Avenue • Chicago 23, Illinois

die blocks

For the production of ferrous and non-ferrous forgings in drop hammers, forging presses, and forging machines, we supply five types of pre-hardened, ready-to-use die blocks, inserts, and tools in SPECIAL MACHINING QUALITY that is commercially machinable *as hard as 477 BHN* with modern, high-speed or carbon tools.

FX—die blocks, inserts and tools for an unusually wide variety of hot work applications, both ferrous and non-ferrous, where reasonable first cost and large volume production is important.

DURODI—die blocks, inserts and tools for a wide variety of closed die-forgings made on forging presses, hammers and machines, involving unusual heat and abrasion problems.

CUPRODIE—die blocks for drop hammer and forging press applications, especially for light and medium weight forgings where long runs and high resistance to heat and abrasion are required.

SHELLEX—die blocks, inserts and tools for long run, close tolerance applications on forging presses, hammers and machines, requiring resistance to impact, shock, and sudden temperature change.

W4X—Inserts, tools and die blocks for close tolerance, long production runs of extrusion and forging presses, forging machines, and hammers.

forgings

"Forgings by Finkl" is synonomous with highest quality because our chromium-nickel-molybdenum heavy-duty forgings have the strength, stamina, and fatigue resistance to withstand the severe stresses and torsional strains encountered in modern heavy-duty machinery.

In addition to our CNM forgings, we are able to furnish forged products of AISI carbon and alloy steels, or many special analyses in the smooth forged, rough- or finish-machined condition.

Among the many specialties we have produced from our MO-LYB-DIE processed alloys are:

- Repair parts for all types of forging equipment
- Containers, liners, and plungers for extrusion presses
- Crankshafts for trimming presses, punch presses, mechanical forming presses, nail machines, engines, and pumps
- Gear and pinion shafts
- Plastic mold, and die casting die blocks
- Cylinders

electric furnace steels

Finkl is one of the few heavy forge plants in the United States to operate its own electric melt shop. This modern, fully equipped shop makes possible not only better control of steel quality, but also more precise production planning of all operations. Since each heat is melted and processed to meet a specific order or application, we can give individual attention to the particular requirements of each customer, thus assuring the best forging for your job.

DIE BLOCKS · FORGINGS · HOT WORK STEELS · ELECTRIC FURNACE STEELS

A. Finkl & Sons Co.

2011 SOUTHPORT AVE · CHICAGO 14, ILLINOIS

Offices in: DETROIT · CLEVELAND · PITTSBURGH · INDIANAPOLIS · HOUSTON · ALLENTOWN · ST. PAUL
COLORADO SPRINGS · SAN FRANCISCO · SEATTLE · BIRMINGHAM · KANSAS CITY · BOSTON · LOS ANGELES

Warehouses in: CHICAGO · DETROIT · BOSTON · LOS ANGELES

Acme-Newport

SUPPLIES AIRCRAFT QUALITY STEELS FOR NEW JET TRANSPORTS

The specifications are rigid, the steel-making precise, for the success of today's high-altitude rockets and guided missiles, and such superspeed planes as the new DC-8 Jetliner shown above. As a specialist in aircraft quality alloy and carbon steels in plate, sheet and strip, Acme-Newport serves a growing number of prime and subcontractors in this industry. Proof of the consistent quality control and utmost dependability provided by this 73-year-old basic steel producer. We'll be glad to demonstrate how Acme-Newport's modern facilities, experienced personnel and fast Red Circle Service can deliver your most exacting steel requirements.

Acme-Newport Steel COMPANY

NEWPORT, KENTUCKY

A SUBSIDIARY OF ACME STEEL COMPANY

RED CIRCLE SERVICE

EXPEDITES YOUR RUSH ORDERS

Watch Autos, Inventories, USW in '59

January 5, 1959

GET SET for an eventful year in steel. You can expect:

A 30 per cent increase in production and shipments. Output will climb to 110 million ingot tons (vs. 85 million last year) and finished steel shipments to 80 million tons (vs. 61.4 million in 1958).

Greater consumption by the automotive, construction, petroleum, machinery, farm implement, railroad, appliance, and container industries.

Widespread reversal of inventory policy. Consumers will add 4 million tons to their stockpiles before July. (From June, 1957, to September, 1958, they were liquidating. Inventories fell from 23 million tons to 13 million. Current estimate: 14 million.)

Explosive contract talks between the industry and the United Steelworkers. Chances are that agreement on a new pact won't be reached before the old one expires on June 30.

No steel shortages unless consumers panic. The industry's capacity (about 146 million ingot tons) assures good deliveries even at demand peaks. But the combined effects of "normal" inventory replenishment and excessive hedging against a threatened strike could make trouble.

Stable prices through the first half. There may be minor revisions in extras before July, but wholesale adjustments are out of the question. If the USW wins a costly package, base prices may go up sharply in late summer.

AUTOMAKERS OPTIMISTIC— New car sales are expected to jump about 30 per cent this year to 5.5 million. "With the right combination of market factors, they could go as high as 6 million, including about 400,000 imported cars," says L. L. Colbert, president of Chrysler Corp.

Look for the automotive industry to regain its status as steel's No. 1 customer this year, a distinction it hasn't had since 1955. Last year, warehouses and distributors held the top spot, taking 18 per cent of domestic shipments (vs. automakers' 15.6 per cent).

BIG YEAR FOR SHEETS—Aided mostly by the upturn in automotive demand, sheets will also benefit from a 10-15 per cent pickup in appliance sales. Construction may take 15 or 20 per cent more steel as expenditures reach an all-time high (more than $52 billion).

PICKUP FOR BARS— Like sheets, bars will have an expanded automotive market. Increased production of cars and appliances will require more fasteners (made from bars). Shipments to machinery and railroad equipment builders are expected to improve. Mining equipment is on the upgrade, and sales to farm implement makers will continue on a high level.

PLATES WILL GAIN— Greater demand for line pipe and railroad cars will bolster plate shipments this year. Wide plates may soon be in tight supply. Construction requirements will increase moderately, offsetting a decline in shipbuilding needs.

TUBULAR OUTLOOK BRIGHT—Line pipe bookings will improve as gas transmission companies push their expansion programs. Demand for oil country goods will increase as inventories hit bedrock. It's estimated that 53,000 to 55,000 wells will be drilled this year (vs. 49,000 in 1958).

PRODUCTION REBOUNDS— Although New Year's Day operations were somewhat curtailed, the ingot rate climbed 6 points last week to 75 per cent of capacity. Production was about 1,943,000 net tons of steel for ingots and castings.

WHERE TO FIND MARKETS & PRICES

	News	Prices
Bars, Merchant	445	448
Reinforcing	446	449
Boiler Tubes	...	*
Canada	...	...
Clad Steel	...	452
Coke	...	456
Coal Chemicals	...	456
Charts:		
Finished Steel	447	...
Ingot Rate	446	...
Scrap Prices	459	...
Comparisons	...	447
Contracts Placed	466	...
Contracts Pend.	466	...
Electrodes	...	456
Fasteners	...	451
Ferroalloys	443	458
Fluorspar	...	456
Footnotes	...	451
Imported Steel	...	456
Ingot Rates	446	...
Metal Powder	...	456

	News	Prices
Nonferrous Met.	462	464
Ores	...	456
Pig Iron	444	454
Piling	...	448
Plates	443	448
Plating Material	...	465
Prestressed Strand	...	451
Price Indexes	...	447
Producers' Key	449	...
R.R. Materials	443	451
Refractories	...	456
Scrap	459	460
Semifinished	...	448
Service Centers	446	454
Sheets	442	449
Silicon Steel	...	450
Stainless Steel	445	452
Strip	442	450
Structurals	466	448
Tin Mill Prod.	446	450
Tool Steel	...	452
Tubular Goods	446	452
Wire	...	450

See Page 115, Dec. 1, 1958 issue for current prices on boiler tubes.

TUBE DISTRIBUTORS BALANCED SERVICE

cuts your steel tubing handling costs!

Fact!...You can cut your steel tubing handling, processing, storage and inventory costs – and still maintain production continuity – *without paying a premium*, when you buy in warehouse quantities.

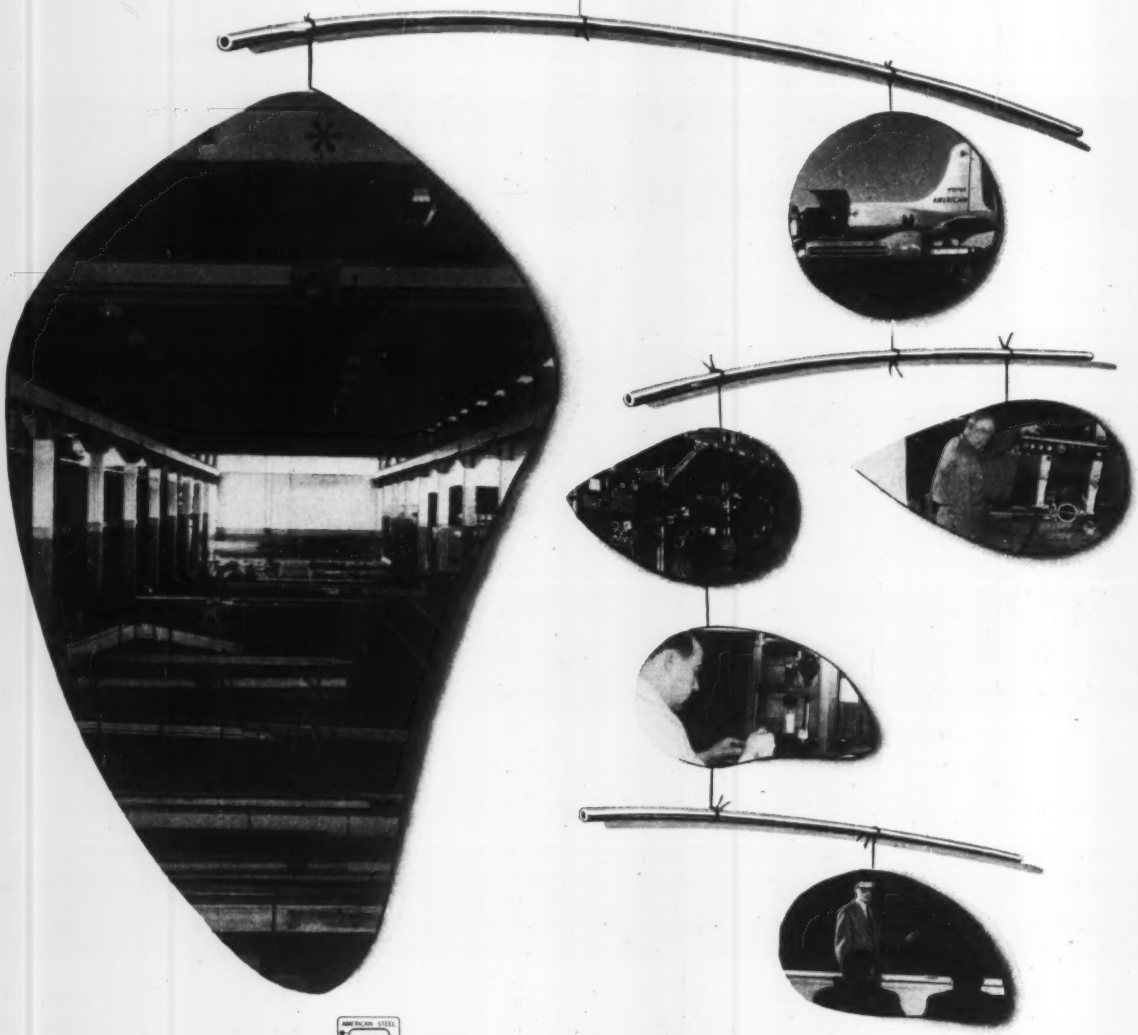
How?...By making full use of TD's "balanced service":

1. Thousands of sizes in all standard types and analyses in stock*.
2. Systematic handling that insures on-time-delivery.
3. Personalized Inventory Plan custom-tailored to your requirements.
4. TD's *complete* quality control program.
5. Extra warehouse services.
6. Technical assistance from steel tubing specialists.

***THOUSANDS OF SIZES IN ALL STANDARD TYPES AND ANALYSES IN STOCK!** TD's warehouse has more than 321 miles of steel tubing on hand. You can virtually be sure of getting what you want right out of stock thereby eliminating your having to "shop-around" for other sources of supply. That goes for hard to get items, also. TD's inventory makes one-call steel tube purchasing a reality.

Call TD for–stainless, alloy and carbon steel tubing, both aircraft and commercial quality.

Write Dept. S13 today for your copy of "Eighteen Ways to Save Money in Your Steel Tubing Purchasing," and the name of your nearest TD representative.



TUBE DISTRIBUTORS CO., INC.
GARDEN CITY NEW YORK

STEEL
QUARTERLY SURVEY

COMPONENTS	CURRENT INVENTORIES					1st Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
CASTINGS . . . . . Die, gray iron, malleable, nonferrous, steel.	3%	22%	54%	20%	1%	6%	65%	29%
OTHER FORMED COMPONENTS . . . . Forgings, stampings, springs, wire shapes.	2%	18%	50%	22%	8%	7%	64%	29%
MACHINED COMPONENTS . . . . . Bearings, couplings, cylinders, gears, screw machine products.	2%	20%	51%	22%	5%	7%	63%	30%
ELECTRICAL EQUIPMENT, MOTORS . .	6%	34%	39%	16%	5%	7%	68%	25%
FASTENERS	1%	23%	46%	26%	4%	6%	70%	24%
MECHANICAL RUBBER GOODS, BELTING	6%	38%	37%	17%	2%	4%	76%	20%

FIGURES are percentages of respondents to STEEL's quarterly survey. COLOR UNDERSCORED figures show how most respondents reported.

Buyers To Build Component Stocks

Scattered shortages and lengthening delivery times bring an end to inventory reductions. Here's how reversal of 1958 trend may help your firm this quarter

YOU CAN EXPECT to see a major change in inventory policies this quarter. Responses to STEEL's quarterly survey of component buyers show users plan to purchase more than they'll consume in the next three months.

Some 27 per cent of the respondents think their stocks will be higher at the end of March than they were in December, 1958. Only 6 per cent think they'll be lower. Not since first quarter of 1957 has the number of firms predicting a rise in inventories exceeded those expecting a decline.

• **Across the Board**—Significantly, buyers in each component group told STEEL they plan to boost stocks in the next three months. Thirty per cent of machined component buyers look for higher stocks, while 7 per cent predict a cut in supplies. Three months ago (STEEL, Oct. 6, 1958, p. 111), 23 per cent expected inventories to decline, while only 10 per cent predicted increases.

The trend in electrical equipment and motors is equally sweeping. In STEEL's October survey, only 4 per cent of the buyers thought their stocks would increase in the following three months. Twenty-five per cent now predict a gain.

Inventory cutting continued throughout the fourth quarter, respondents indicate. Some 28 per cent of the buyers say they trimmed stocks in final three months of the year. One in ten added to his inventories.

• **Leadtime Lengthens**—Buyers are building up their supplies for two reasons: Slower deliveries and improved sales. Last summer (STEEL, July 7, 1958, p. 95), component buyers reported deliveries were seldom slow. Three months later, they began to complain about lengthening delivery times for several types of components. Now 30 per cent of buyers say they have some trouble getting quick delivery on at least one type of component. Generally, they report spot shortages which cause moderate inconvenience. Only 2 per cent of buyers complain that deliveries are generally inadequate.

Ten per cent of buyers of bearings say deliveries are slower than they would like. Several buyers of electrical equipment and castings

report difficulty in obtaining rapid delivery.

An eastern Pennsylvania buyer complains: "We have run into trouble where a supplier cuts his work force to the bone, and a pick-up in his business delays his deliveries."

• **Surpluses Disappear** — If your firm supplies components, your selling job should be eased this quarter by the absence of oversized inventories. In early third quarter of 1958, 13 per cent of buyers of motors over 5 hp said their inventories were too high. That figure plummeted to zero in STEEL's current survey. In the same period, the proportion of firms buying forgings and reporting an oversupply dropped from 11 per cent to 2 per cent. A handful of buyers of castings, bearings, screw machine products, and fasteners say they have more than desired.

A look at the days of inventory held by buyers shows why many are planning buildups. Most purchasers of most components kept their inventories between 30 and 60 days in 1958. Some buyers have cut stocks well below 30 days. For example, 44 per cent of buyers of mechanical rubber goods and belting have less than 30 day supplies. Four in ten buyers of electrical equipment and motors have under 30 days' inventory. Three months ago, only 3 in 10 were that low.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 449 & 450

"Our sales are booming," a Pittsburgh district sheetmaker reports. "The labor troubles at Chrysler had little effect on our shipments. On hot-rolled products we're booking orders for late January and early February. On cold rolled, we'll soon be full for February."

Although automakers are taking the lion's share of the tonnage, demand is broad based. The appliance and construction industries are placing large orders, and miscellaneous consumers are filling out their inventories.

Last year's stamping shop volume in New England was about 10 per cent below 1957's but most shops are entering first quarter sheet orders in heavier volume, and are planning to supplement them with additional tonnages by March as a hedge against a possible steel strike at midyear.

Galvanized sheets still lead the demand parade, being sold out at some mills through March. Cold-rolled sheets are booked through February.

Shipments of steel shipping barrels and drums in October totaled 2,790,242 units, down 7 per cent from 3,004,070 units shipped in September, and 10 per cent from 3,116,774 units moved in October, 1957, reports the U. S. Bureau of the Census. Shipments in the first ten months were 26,560,416 units, vs. 30,709,419 in the 1957 period.

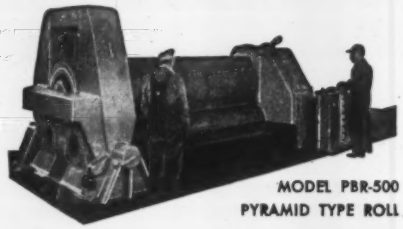
Wheeling Steel Corp. has started negotiations to purchase the mill equipment and facilities of Follansbee Steel Corp., Follansbee, W. Va. Follansbee operations include rolling mills and metal fabricating shops, but only the mill facilities (which adjoin Wheeling Steel properties) are being considered.

If the purchase is made, Wheel-

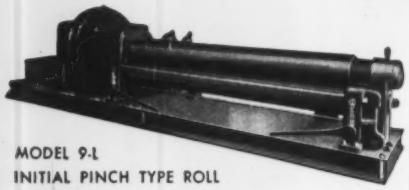
WEBB PLATE FABRICATING MACHINERY

PLATE BENDING ROLLS

The Webb Corporation offers a complete line of Plate Bending Rolls for the rolling of the thinnest plate up to plate 2½" thick. Offered in a variety of lengths and thicknesses. Constructed for the modern fabricating shop.



MODEL PBR-500
PYRAMID TYPE ROLL

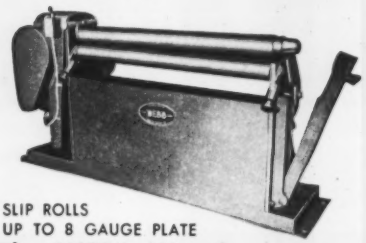


MODEL 9-L
INITIAL PINCH TYPE ROLL

Two types available: the Initial Pinch Type and Pyramid Type machines. All latest advantages of today's modern machine tools are incorporated, utilizing anti-friction bearings, totally enclosed gear drives. Special forming rolls for culvert pipe, stock tanks and other special shapes available.

SLIP ROLLS

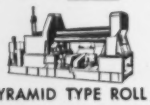
A complete line of small Sheet Metal Forming Rolls are also available. All power-driven with shaft sizes 3" to 5" for the handling of the thinnest gauge material, up to 8 gauge material. Special rolls for the forming of polished sheets, aluminum and stainless steels can be furnished. Complete catalogues on any size machine furnished upon request; write Dept. D.



SLIP ROLLS
UP TO 8 GAUGE PLATE

Let Speed PAY-The WEBB Way!

SLIP ROLLS



PYRAMID TYPE ROLL

INITIAL TYPE ROLL

STEELWORKERS

Also Manufacturers of INDUSTRIAL WEIGHING EQUIPMENT

Since 1881 THE WEBB CORP.
WEBB CITY, MO., U. S. A.

ing will be able to move into some new markets and be in position to expand its sheet production. Follansbee Steel would continue terne coating and other operations.

Plates . . .

Plate Prices, Page 448

The market for plates has become noticeably more active since the recent Supreme Court decision in the Memphis gas rate case. Orders are expected to expand early this year.

The spurt in demand that followed the court's decision was for line pipe ordered before the lower court's adverse decision in the Memphis case a year ago, which decision caused many pipeline projects to be suspended. Some of these jobs are now being reactivated, and within the next few months it's expected that a number of new projects will come out for bids.

Charles Lukens Huston Jr., president, Lukens Steel Co., Coatesville, Pa., thinks demand for steel plates will lag behind other products in the first quarter, but he sees a pickup in the second quarter, some easing in the third, and a marked improvement in the fourth quarter.

Rails, Cars . . .

Track Material Prices, Page 451

Railroad business is bound to improve and should give a lift to the market for light plates and structurals. More car and locomotive orders have been placed the last month or so than in the previous six months.

The Chicago & Northwestern Railroad plans to repair and rebuild nearly 8000 freight cars in its Clinton, Iowa, shops in 1959. The $9 million program will begin the first week of January. The shops will be operated at full capacity, and the number of employees will be increased from about 400 to more than 650.

About 4000 of the 6000 boxcars included in the program will be converted from rough cars used for less-than-carload service to Class A cars. Production will average 31 cars daily.

The New York Central System is contemplating the purchase of 15,000 tons of rails for 1959 delivery.

Orders for 6295 domestic freight cars in November were the largest for any month since April, 1957, when 6429 were placed, reports the American Railway Car Institute and the Association of American Railroads in a joint statement. The November total compared with 781 in October and 1070 in November, 1957.

Freight car deliveries during the month totaled 1803, vs. 1591 in October and 7142 in November of last year.

Cars on order and undelivered on Dec. 1 numbered 27,962, vs. 23,670 on Nov. 1, and 59,194 on Dec. 1, 1957.

Ferroalloys . . .

Ferroalloy Prices, Page 458

Five crushed ferroalloys—50 per cent ferrosilicon, standard and medium carbon ferromanganese, silicomanganese, and calcium-silicon—are being offered in preweighed bags (about 50 lb) by Electro Metallurgical Co., a division of Union Carbide Corp., New York. Handling and weighing of loose mate-

MicroRold®

stainless steel soars with

ATLAS ICBM

on first full range flight!

U. S. missile program one step nearer to complete operational capability.

On the evening of November 28, 1958, a 100-ton ATLAS lifted from its pad at Cape Canaveral and arched majestically into the heavens. 30 minutes later its nose cone shot into the Atlantic, marking the first successful completion of its fully-programmed distance of 6300 statute miles.

The main part of the ATLAS structure is literally a huge fuel tank, the shell of which is thin gauge MicroRold stainless steel. Important factors in selection of stainless steel for the outer skin of the ATLAS are great strength at both high and low temperatures, resistance to corrosive exotic fuels and good workability.

The stainless skin, supplied exclusively by Washington Steel, requires extremely close control of mechanical properties and gauge tolerance which are regularly produced through Washington Steel's long experience with precision rolling equipment.

NOW IN ORBIT!

4½ ton third stage
118 to 625 mile altitude
December 18, 1958

WASHINGTON STEEL CORPORATION

1-O WOODLAND & GRIFFITH AVENUES

WASHINGTON, PA.

LOW-COST SCRAP HANDLING
ERIE ORANGE PEEL GRAPPLES

Strong closing action. Picks up anything it can get its blades around. All-welded high-carbon steel construction means low-cost performance for a long time.

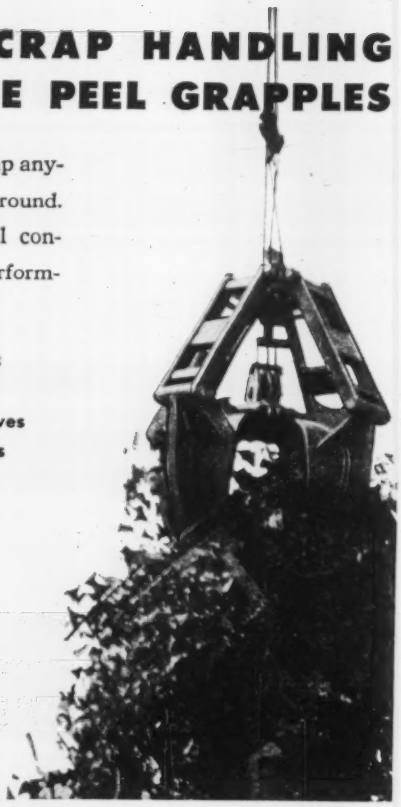
OTHER IMPORTANT FEATURES:

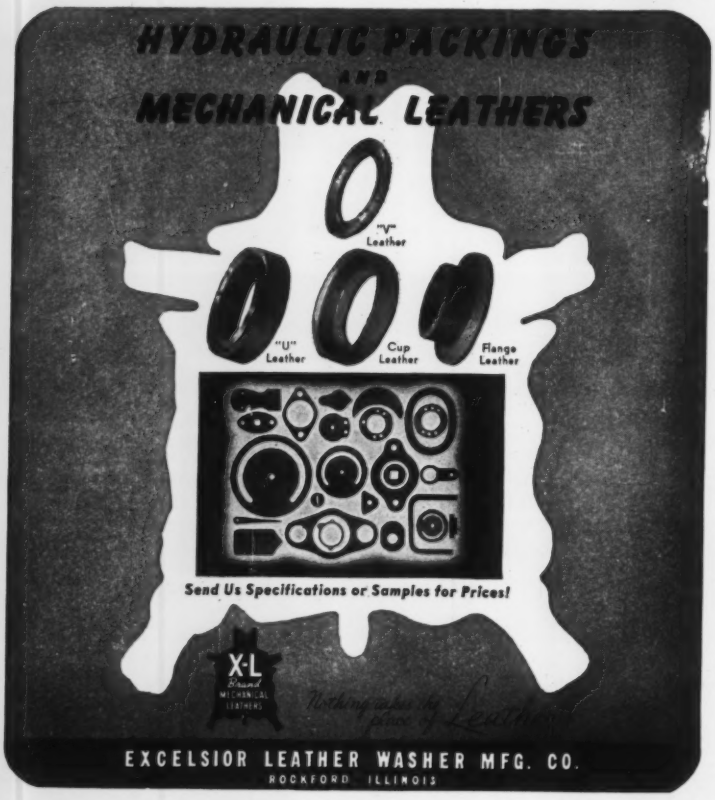
- Multi-Sheave Reeving
- High Wear-Resistant Alloy Sheaves
- Recessed Alemite Grease Fittings
- 3 and 4-Blade Models
- ¼ to 4 cu. yds.

Write for Free Booklet

ERIE STRAYER COMPANY

1419 RUDOLPH AVE., ERIE, PA.





rial at the steel mill are eliminated.

Carbo-sil No. 4, a silicon carbide additive for gray and malleable iron cupolas, is being marketed by American Metallurgical Products Co. Inc., Pittsburgh. The 10 and 15 lb units are encased in lacquered steel containers with locked, unsoldered seams. They protect the precrushed material.

Vanadium Corp. of America, New York, recently announced the addition of three new exothermic ferroalloys to its Vancoram product line. It now has five different exothermic types: Thermokrom, ferrochromium; Thermosil, ferrosilicon; Thermokromsil, ferrochrome silicon; Thermovan, ferrovanadium; and Thermocol, ferrocolumbium.

This series of alloys may be used in most types of alloy steels and irons, including constructional alloy steels, low alloy high strength steels, stainless and heat resisting alloys, spring steels, and tool steels. Exothermic ferrocolumbium and ferrovanadium may also be used for small additions to ferrous metals for beneficial effects on grain size.

Pig Iron . . .

Pig Iron Prices, Page 454

While requirements of pig iron and coke are at the best rate in about a year, a higher level of activity is anticipated during this quarter. Foundry operations continue spotty, but the situation is expected to improve gradually as the quarter advances. The strike at the plants of International Harvester has held down foundry iron consumption in the Midwest over the last six or seven weeks.

Mystic foundry pig iron price for the first quarter, 1959, is unchanged at $68, f.o.b. cars, Everett, Mass., plus current differentials for silicon, phosphorus, and manganese.

November Blast Furnace Output Largest in Year

Blast furnace production (pig iron, ferromanganese, and spiegeleisen) totaled 5,946,163 net tons in November, largest monthly output since October, 1957, when 6,519,478 tons were produced, reports the American Iron & Steel Institute. Of the November total, 39,275 tons were ferromanganese and spiegeleisen.

In the preceding month, output

was 5,872,958 tons (36,963, ferromanganese and spiegeleisen); in November, 1957, the total was 5,779,879 tons (68,637, ferromanganese and spiegeleisen).

Production in the first 11 months of this year was 51,691,210 tons, of which 417,951 tons were ferromanganese and spiegeleisen. In the like 1957 period output amounted to 74,059,991 tons, of which 715,904 tons were ferromanganese and spiegeleisen. Production by states during November and the first 11 months:

BLAST FURNACE PRODUCTION STATISTICS
(Net tons)

States:	November, 1958	First 11 Months, 1958
Massachusetts, New York	361,847	3,268,930
Pennsylvania	1,491,588	13,395,990
Maryland, Virginia, West Virginia	518,783	5,404,246
Kentucky, Tennessee, Texas	144,703	1,421,085
Alabama	314,667	3,063,286
Ohio	1,112,874	8,587,323
Indiana	779,353	6,953,318
Illinois	501,755	3,697,110
Michigan, Minnesota	423,389	2,894,116
Colorado, Utah, California	297,204	3,005,806
Totals	5,946,163*	51,691,610**

*Includes 39,275 tons of ferromanganese and spiegeleisen.
**Includes 417,951 tons of ferromanganese and spiegeleisen.
Data from American Iron & Steel Institute.

Steel Bars . . .

Bar Prices, Page 448

Although demand for carbon steel bars is holding up well, there are open spaces in first quarter order books. Reason: Capacity is greater than it was a year ago, and with relatively prompt shipments available, consumers are inclined to hold down forward orders.

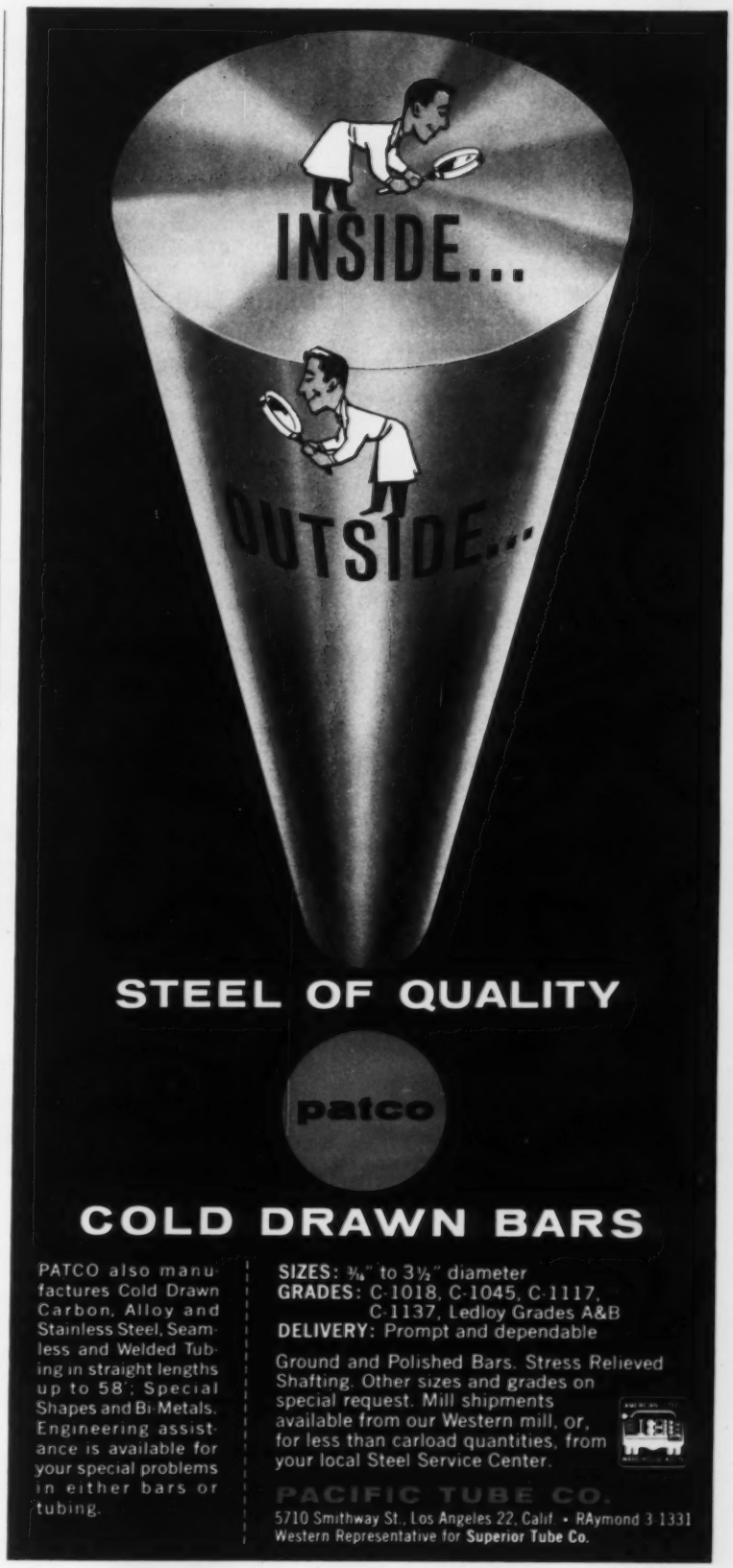
In some consuming areas, New England for example, demand for carbon and alloy bars is not keeping pace with the upturn in flat-rolled steel buying. Consumers have low inventories, and they are depending largely on prompt shipment tonnage. Some forward covering by late first quarter is likely.

Stainless Steel . . .

Stainless Steel Prices, Page 452

Demand for stainless steel bars is more active for January and February shipment. Automotive requirements are heavier, notably in flat-rolled items.

The recent increase in bar and wire prices by one leading producer has not been generally followed by other mills, but indica-



tions are the higher prices will stick.

Grade 430 for automobile trim and parts is in stronger demand with makers reporting more orders on books for January and February delivery.

Crucible Steel Co. of America is withdrawing from the stainless welding electrode business. It is continuing to make and sell stainless core wire for electrode manufacturers and spooled and layer-wound wire to makers of welding equipment.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 449

The outlook for reinforcing steel demand in 1959 is bright. In the Midwest, Illinois is expected to spend $300 million on highway construction, of which $190 million is anticipated in grants from the federal government. Contracts awarded in 1958 totaled $295 million.

Indiana is planning a record breaking $156 million program which will provide more road expansion in a single year than in all four years of any previous administration. The total allocation exceeds the 1958 record by $4 million.

Bids are in on 8510 tons of reinforcing bars required for drydock No. 6 at the Puget Sound (Wash.) Navy yard. Bids will be opened soon for 1165 tons required in construction of the Seattle freeway bridge. In January, Seattle's Tolt River water supply dam and supply line will require 1600 tons.

Tin Plate . . .

Tin Plate Prices, Page 450

Youngstown Sheet & Tube Co. will expand its tin plate facilities with a second continuous annealing line at its No. 2 tin mill at its Indiana Harbor Works, East Chicago, Ind. Construction will start this year, will be completed in 1960.

Tubular Goods . . .

Tubular Goods Prices, Page 452

Demand for oil country goods has improved in recent weeks, reflecting increasing well drilling operations. In the week ended Dec. 15, there were 901 rigs operating in Texas, vs. 1073 in the like 1957 week, shows a Hughes Tool Co. survey. For the nation, the count was 2321 active rigs, 231 less than in the same week of 1957.

Texas oil production in January will be on a 12-day producing schedule, with the daily allowable holding at the December level.

Steel Ingot Production Declines in November

Production of ingots and steel for castings amounted to 8,549,068 net tons in November, reports the American Iron & Steel Institute. Of the total, 7,843,278 tons were carbon steel; 610,413 tons, alloy steel; and 95,647 tons, stainless and heat resisting steel.

In the preceding month output totaled 8,817,778 tons (8,057,216 tons, carbon steel; 640,242 tons, alloy; 120,320 tons, stainless and heat resisting). Production in November, 1957, was 8,392,919 tons (6,674,064 tons, carbon steel; 673,745 tons, alloy; 1,045,110 tons, carbon, hot topped ingots).

Output in the first 11 months this year totaled 76,436,113 net tons, vs. 105,294,711 tons in the corresponding 1957 period. Production by states for November and the first 11 months:

STEEL PRODUCTION STATISTICS
(Net tons)

States:	November, 1958	First 11 Months, 1958
Massachusetts, Rhode Island, and Connecticut	10,287	149,157
New York	425,776	3,597,790
Pennsylvania	2,007,837	18,836,055
New Jersey, Delaware, and Maryland	531,519	5,778,215
Virginia, W. Virginia, Kentucky, and Tennessee	383,163	3,548,620
Georgia, Alabama, Mississippi	293,054	3,181,036
Ohio	1,514,634	12,291,180
Indiana	1,270,158	11,284,549
Illinois	723,302	6,237,633
Michigan, Minnesota	632,039	4,391,779
Missouri, Oklahoma, Texas, and Colorado	307,100	3,003,318
Utah, Washington, Oregon	196,675	1,856,014
California	253,524	2,280,817
Totals	8,549,068	76,436,113
Tonnage lost by work stoppages	20,500	125,600

Data from the American Iron & Steel Institute.

Distributors . . .

Prices, Page 454

Distributors generally expect a pickup in order volume this month. Some think first quarter business will show a sizable gain over that in the fourth quarter of 1958. Demand for automotive steel is likely to increase, and a seasonal rise in construction steel requirements is anticipated before the quarter ends.

DISTRICT INGOT RATES
(Percentage of Capacity Engaged)

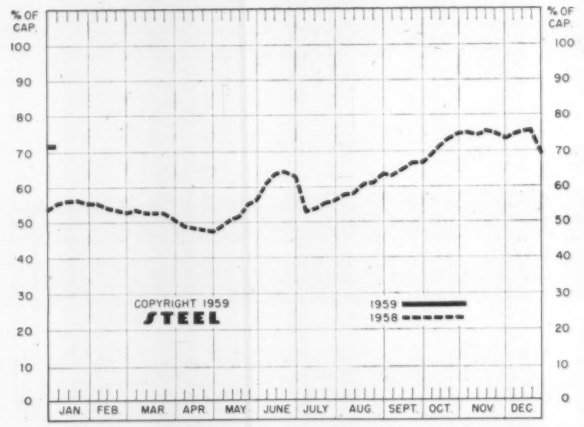
	Week Ended Jan. 4	Change	Same Week 1958	Same Week 1957
Pittsburgh	64	+ 9*†	51	100
Chicago	87	+ 0.5*	67.5	100
Eastern	71	+14	80	102
Youngstown	64	+14	48	104
Wheeling	75	+ 4†	54.5	99
Cleveland	73	+ 7	57.5	93
Buffalo	66	0	56	107.5
Birmingham	73	+ 1.5†	71.5	94.5
Cincinnati	83	— 5*	65	94.5
St. Louis	96	+23	74	84
Detroit	101	+12*	73.5	103
Western	79.5	+ 0.5†	77	103
National Rate	75†	+ 6	55	98

INGOT PRODUCTION‡

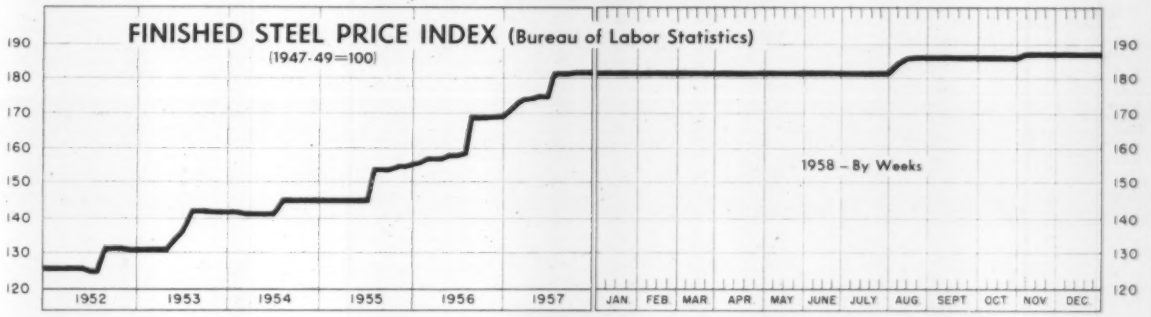
	Week Ended Jan. 4	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	127.3	114.5	123.6	93.4
NET TONS (In thousands)	2,045	1,840	1,985	1,501

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. Weekly capacity (net tons): 2,699,173 in 1958; 2,559,490 in 1957; 2,461,893 in 1956.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 30, 1958	Week Ago	Month Ago	Nov. Avg	Year Ago
187.4†	187.4	187.4	187.4	181.7

†Preliminary

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Edned Dec. 30

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.525
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.553
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.695
Sheets, C.R., Stainless, 302 (lb)	0.688
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.493
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	20.525
Pipe, Galv., Buttweld (100 ft)	24.315
Pipe, Line (100 ft)	205.710
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	26.157
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.653
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.828
Wire, Barbed (80-rod spool)	8.719
Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Dec. 31 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	239.15	189.74
Index in cents per lb	6.713	6.713	6.713	6.479	5.140

STEEL's ARITHMETICAL COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$145.42	$114.64
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	39.66	39.66	45.50	33.17	31.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Dec. 31 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.425	4.15
Bars, H.R., Chicago	5.675	5.675	5.675	5.425	4.15
Bars, H.R., deld. Philadelphia	5.975	5.975	5.975	5.725	5.302
Bars, C.F., Pittsburgh	7.65*	7.65*	7.65*	7.30*	5.20
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.275	4.10
Shapes, Std., Chicago	5.50	5.50	5.50	5.275	4.10
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.545	4.38
Plates, Pittsburgh	5.30	5.30	5.30	5.10	4.10
Plates, Chicago	5.30	5.30	5.30	5.10	4.10
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.10	4.35
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.10	4.10
Plates, Claymont, Deld.	5.30	5.30	5.30	5.70	4.55
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	4.925	3.925
Sheets, H.R., Chicago	5.10	5.10	5.10	4.925	3.925
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.05	4.775
Sheets, C.R., Chicago	6.275	6.275	6.275	6.05	4.775
Sheets, C.R., Detroit	6.275	6.275	6.275	6.05-6.15	4.975
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.60	5.275
Strip, H.R., Pittsburgh	5.10	5.10	5.10	4.925	4.425
Strip, H.R., Chicago	5.10	5.10	5.10	4.925	3.925
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.15	5.45
Strip, C.R., Chicago	7.425	7.425	7.425	7.15	5.70
Strip, C.R., Detroit	7.425	7.425	7.425	7.25	5.45-6.05
Wire, Basic, Pittsburgh	8.00	8.00	8.00	7.65	5.525
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.55
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.30	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$96.00	$75.50
Wire rods ⅜-⅝" Pitts.	6.40	6.40	6.40	6.15	4.525

PIG IRON, Gross Ton

	Dec. 31 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Phila.	70.41	70.41	70.41	70.01	60.75
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.51	61.25
No. 2 Fdry, Birm.	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry(Birm.)deld. Cin.	70.20	70.20	70.20	70.20	60.43
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	200.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$42.50	$41.50	$41.50	$31.50	$32.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	35.00	37.00	29.50
No. 1 Heavy Melt, Chicago	42.50	42.00	42.50	31.00	30.50
No. 1 Heavy Melt, Valley	42.50	42.50	42.50	29.50	29.50
No. 1 Heavy Melt, Cleve.	39.00	39.00	39.00	26.50	28.50
No. 1 Heavy Melt, Buffalo	33.50	33.50	33.50	30.50	29.50
Rails, Rerolling, Chicago	62.50	62.50	63.50	49.50	42.50
No. 1 Cast, Chicago	45.50	45.50	45.50	38.50	32.50

COKE, Net Ton

Beehive, Furn., Connisvl.	$15.25	$15.25	$15.25	$15.25	$14.75
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	30.50	30.50	30.50	30.50	25.25

Steel Prices

Mill prices as reported to STEEL, Dec. 31, cents per pound except as otherwise noted. Changes shown in italics. Code number following mill points indicates producing company. Key to producers, page 449, footnotes, page 451.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B3 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 ..104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....113.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 ..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32 ..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 ..126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
N. Tonawanda,N.Y. B11..6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14 ..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ....5.55
LosAngeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W144 ..6.80

H.S., L.A. Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ....8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Struthers,O. Y1 ....8.05

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ....8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ....5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ....5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....13.55

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14 ..7.95
SparrowsPoint,Md. B2 ..7.95
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, ALLOY
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L17 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14 ..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ..5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. c.l. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 N5.675
Aliquippa,Pa.(9) J5 ..5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ..5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P22 ....5.675
KansasCity,Mo.(9) S5 ..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O. (23) R2...6.15
Midland,Pa.(23) C18 ....6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
N.T'wan'a,N.Y.(23)B11 6.025
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle B3, N14 ....6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5 ..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded (Including loaded extra)

Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.050c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ..7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B2 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putman,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
WillimanticConn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
CumberlandMd. (5) .C19 6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ...9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. B5 ....9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ..9.325
Massillon,O. R2, R8 ....9.025
Midland, Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N. J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 ....9.025
Warren,O. C17 ....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ..9.325
Youngstown F3, Y1 ..9.025

BARS, Reinforcing, Billet (To fabricators)

AlabamaCity, Ala. R2	.5.675
Atlanta A11	.5.675
Birmingham C15	.5.675
Buffalo R2	.5.675
Cleveland R2	.5.675
Ecorse, Mich. G5	.5.675
Emeryville, Calif. J7	.6.425
Fairfield, Ala. T2	.5.675
Fairless, Pa. U5	.5.825
Fontana, Calif. K1	.6.375
Ft. Worth, Tex. (4) (26) T4	5.925
Gary, Ind. U5	.5.675
Houston S5	.5.925
Ind. Harbor, Ind. I-2, Y1	5.675
Johnstown, Pa. B2	.5.675
Joliet, Ill. P22	.5.675
KansasCity, Mo. S5	.5.925
Kokomo, Ind. C16	.5.775
Lackawanna, N.Y. B2	.5.675
LosAngeles B3	.6.375
Madison, Ill. L1	.5.875
Milton, Pa. M18	.5.825
Minnequa, Colo. C10	.6.125
Niles, Calif. P1	.6.375
Pittsburg, Calif. C11	.6.375
Pittsburgh J5	.5.675
Portland, Oreg. O4	.6.425
SandSprings, Okla. S5	.5.925
Seattle B3, N14	.6.425
S. Chicago, Ill. R2, W14	.5.675
S. Duquesne, Pa. U5	.5.675
S. SanFrancisco B3	.6.425
SparrowsPoint, Md. B2	.5.675
Sterling, Ill. (1) N15	.5.675
Sterling, Ill. N15	.5.775
Struthers, O. Y1	.5.675
Tonawanda, N.Y. B12	.6.10
Torrance, Calif. C11	.6.375
Youngstown R2, U5	.5.675

BARS, Reinforcing, Billet (Fabricated; to Consumers)

Baltimore B2	.7.42
Boston B2, U8	.8.15
Chicago U8	.7.41
Cleveland U8	.7.39
Houston S5	.7.60
Johnstown, Pa. B2	.7.33
KansasCity, Mo. S5	.7.60
Lackawanna, N.Y. B2	.7.35
Marion, O. P11	.6.70
Newark, N.J. U8	.7.80
Philadelphia U8	.7.63
Pittsburgh J5, U8	.7.35
SandSprings, Okla. S5	.7.60
Seattle B3, N14	.7.95
SparrowsPt., Md. B2	.7.33
St. Paul U8	.8.17
Williamsport, Pa. S19	.7.25

BARS, Wrought Iron

Economy, Pa. (S.R.) B14	14.90
Economy, Pa. (D.R.) B14	18.55
Economy (Staybolt) B14	19.00

BARS, Rail Steel

ChicagoHts. (3) C2, I-2	.5.575
ChicagoHts. (4) (44) I-2	.5.675
ChicagoHts. (4) C2	.5.675
Franklin, Pa. (3) F5	.5.575
Franklin, Pa. (4) F5	.5.675
JerseyShore, Pa. (3) J8	.5.55
Marion, O. (3) P11	.5.575
Tonawanda (3) B12	.5.575
Tonawanda (4) B12	.6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Lackawanna, N.Y. B2	.5.10
Allenport, Pa. P7	.5.10
Aliquippa, Pa. J5	.5.10
Ashland, Ky. (8) A10	.5.10
Cleveland J5, R2	.5.10
Conshohocken, Pa. A3	.5.15
Detroit (8) M1	.5.10
Ecorse, Mich. G5	.5.10
Fairfield, Ala. T2	.5.10
Fairless, Pa. U5	.5.15
Farrell, Pa. S3	.5.10
Fontana, Calif. K1	.5.825
Gary, Ind. U5	.5.10
Geneva, Utah C11	.5.20
GraniteCity, Ill. (8) G4	.5.20
Ind. Harbor, Ind. I-2, Y1	5.10
Irvin, Pa. U5	.5.10
Lackawanna, N.Y. B2	.5.10
Mansfield, O. E6	.5.10
Munhall, Pa. U5	.5.10
Newport, Ky. A2	.5.10
Niles, O. M21, S3	.5.10
Pittsburg, Calif. C11	.5.80
Pittsburgh J5	.5.10
Portsmouth, O. P12	.5.10
Riverdale, Ill. A1	.5.10
Sharon, Pa. S3	.5.10
S. Chicago, Ill. U5, W14	.5.10
SparrowsPoint, Md. B2	.5.10
Steubenville, O. W10	.5.10
Warren, O. R2	.5.10
Weirton, W.Va. W6	.5.10
Youngstown U5, Y1	.5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles, O. M21, S3	.6.275

SHEETS, H.R. Alloy

Gary, Ind. U5	.8.40
Ind. Harbor, Ind. Y1	.8.40
Irvin, Pa. U5	.8.40
Munhall, Pa. U5	.8.40
Newport, Ky. A2	.8.40
Youngstown U5, Y1	.8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa, Pa. J5	.7.525
Ashland, Ky. A10	.7.525
Cleveland J5, R2	.7.525
Conshohocken, Pa. A3	.7.575
Ecorse, Mich. G5	.7.525
Fairfield, Ala. T2	.7.525
Fairless, Pa. U5	.7.575
Farrell, Pa. S3	.7.525
Fontana, Calif. K1	.8.25
Gary, Ind. U5	.7.525
Ind. Harbor, Ind. I-2, Y1	7.525
Irvin, Pa. U5	.7.525
Lackawanna (35) B2	.7.525
Munhall, Pa. U5	.7.525
Niles, O. S3	.7.525
Pittsburgh J5	.7.525
S. Chicago, Ill. U5, W14	7.525
Sharon, Pa. S3	.7.525
SparrowsPoint (36) B2	.7.525
Warren, O. R2	.7.525
Weirton, W.Va. W6	.7.525
Youngstown U5, Y1	.7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10	.5.35
Cleveland R2	.5.875
Warren, O. R2	.5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	.7.05
Middletown, O. A10	.6.775
Warren, O. R2	.7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity, Ala. R2	.6.275
Allenport, Pa. P7	.6.275
Aliquippa, Pa. J5	.6.275
Cleveland J5, R2	.6.275
Conshohocken, Pa. A3	.6.325
Detroit M1	.6.275
Ecorse, Mich. G5	.6.275
Fairfield, Ala. T2	.6.275
Fairless, Pa. U5	.6.325
Follansbee, W.Va. F4	.6.275
Fontana, Calif. K1	.7.40
Gary, Ind. U5	.6.275
GraniteCity, Ill. G4	.6.375
Ind. Harbor, Ind. I-2, Y1	6.275
Irvin, Pa. U5	.6.275
Lackawanna, N.Y. B2	.6.275
Mansfield, O. E6	.6.275
Middletown, O. A10	.6.275
Newport, Ky. A2	.6.275
Pittsburg, Calif. C11	.7.225
Pittsburgh J5	.6.275
Portsmouth, O. P12	.6.275
SparrowsPoint, Md. B2	.6.275
Steubenville, O. W10	.6.275
Warren, O. R2	.6.275
Weirton, W.Va. W6	.6.275
Yorkville, O. W10	.6.275
Youngstown Y1	.6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa, Pa. J5	.9.275
Cleveland J5, R2	.9.275
Ecorse, Mich. G5	.9.275
Fairless, Pa. U5	.9.325
Fontana, Calif. K1	.10.40
Gary, Ind. U5	.9.275
Ind. Harbor, Ind. I-2, Y1	9.275
Lackawanna (37) B2	.9.275
Pittsburgh J5	.9.275
SparrowsPoint (38) B2	.9.275
Warren, O. R2	.9.275
Weirton, W.Va. W6	.9.275
Youngstown Y1	.9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala. City, Ala. R2	7.225	....
Ashland, Ky. A10	7.225	7.475
Canton, O. R2	7.225	7.75
Fairfield T2	7.225	7.475
Gary, Ind. U5	7.225	7.475
GraniteCity, Ill. G4	7.325	....
Ind. Harbor I-2	7.225	7.475
Irvin, Pa. U5	7.225	7.475
Kokomo, Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts., Calif. C11	7.975	....
SparrowsPt. B2	7.225	....
Pittsburgh J5	7.225	....

SHEETS, Culvert—Pure Iron

Ind. Harbor, Ind. I-2	.7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity, Ala. R2	.6.875‡
Ashland, Ky. A10	.6.875†
Canton, O. R2	.6.875‡
Dover, O. E6	.6.875†
Fairfield, Ala. T2	.6.875†
Gary, Ind. U5	.6.875†
GraniteCity, Ill. G4	.6.975*
Ind. Harbor, Ind. I-2	.6.875†
Irvin, Pa. U5	.6.875†
Kokomo, Ind. C16	.6.975‡
MartinsFerry, O. W10	.6.875*
Middletown, O. A10	.6.875†
Pittsburg, Calif. C11	.7.625*
Pittsburgh J5	.6.875†
SparrowsPt., Md. B2	.6.875†
Warren, O. R2	.6.875†
Weirton, W.Va. W6	.6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Wall Casing

Fontana, Calif. K1	.7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin, Pa. U5	.10.125
SparrowsPt. (39) B2	.10.025
Pittsburgh J5	.10.125

SHEETS, Galvannealed Steel

Canton, O. R2	.7.275
Irvin, Pa. U5	.7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland, Ky. A10	.7.125
Middletown, O. A10	.7.125

SHEETS, Electrogalvanized

Cleveland (28) R2	.7.65
Niles, O. (28) R2	.7.65
Youngstown J5	.7.50
Weirton, W.Va. W6	.7.50

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 2)	9.625
Butler, Pa. A10 (type 2)	9.625

SHEETS, Enameling Iron

Ashland, Ky A10	.6.775
Cleveland R2	.6.775
Fairfield, Ala. T2	.6.775
Gary, Ind. U5	.6.775
GraniteCity, Ill. G4	.6.875
Ind. Harbor, Ind. I-2, Y1	6.775
Irvin, Pa. U5	.6.775
Middletown, O. A10	.6.775
Niles, O. M21, S3	.6.775
Youngstown Y1	.6.775

BLUED STOCK, 29 Gage

Dover, O. E6	.8.70
Follansbee, W.Va. F4	.8.70
Ind. Harbor, Ind. I-2	.8.70
Mansfield, O. E6	.8.70
Warren, O. R2	.8.70
Yorkville, O. W10	.8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom, W.Va. W10	7.225
Gary, Ind. U5	.7.225
Mansfield, O. E6	.7.225
Middletown, O. A10	.7.225
Niles, O. M21, S3	.7.225
Warren, O. R2	.7.225
Weirton, W.Va. W6	.7.225

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10	.7.625

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simmons Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring Corp.
W2 Wallingford Steel Corp.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Buffalo(27) R2	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2,Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. F4	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, E5	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3	7.975
Pawtucket,R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Wallingford,Conn. W2	7.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. C18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

STRIP, C.R. Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
New York W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.60
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.75	10.00	10.40
Pittsburg,Calif. C11	9.10	9.35	9.75
SparrowsPoint,Md. B2	9.10	9.35	9.75
Yorkville,O. W10			

ELECTROLYTIC TIN-COATED SHEET (20-27 Ga.; Dollars per 100 lb)

Aliquippa,Pa. J5	7.90	8.10
Niles,O. R2	7.90	8.10

TIN PLATE, American 1.25 lb / 1.50 lb

	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fairless,Pa. U5	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Ind.Harb. Y1	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.25
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5	$11.25

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed 1½¢ lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.55	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed 1½¢ lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.) — Grain Oriented

	T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
N.Tonawanda,N.Y. B11	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5	10.00
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W2	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C10	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	11.65
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	11.95
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb keg)
To Dealers (33)

Wheeling,W.Va. W10	$9.80

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	177
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	10.26
Chicago W13	10.26
Crawfordsville,Ind. M8	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala. T2	10.26
Houston S5	10.51
Jacksonville,Fla. M8	10.36
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
S.Chicago,Ill. R2	10.26
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill. (37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.60
Chicago W13	10.60
Crawfordsville,Ind. M8	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala. T2	10.60
Houston S5	10.85
Jacksonville,Fla. M8	10.70
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill. (37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.65
Chicago W13	10.65
Crawfordsville,Ind. M8	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. M8	10.75
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill. (37) N15	10.75

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Sterling,Ill.(1) N15	177
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198††

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192††

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala. R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.85
Bartonville K4	17.95	19.75
Cleveland A7	17.85	....
Craw'dsville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.25	18.80†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
Sterling(37)N15	17.25	19.05††
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.10	9.775§
Bartonville(48) K4	9.10	9.775
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80‡‡
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown B2(48)	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
Kans.City(48) S5	9.25	9.80**
Kokomo(48) C16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Monessen (48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
Sterling(48)	N15 9.25	9.925††
St'ling(1)(48)N15	9.15	9.825††
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass. A7	9.30	9.85†

Based on zinc price of: *13.50. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, shipments of one to four containers, per cent off list, f.o.b. mill)

BOLTS

Machine Bolts

Full Size Body (cut thread)
½ in. and smaller
3 in. and shorter ... 55.0
3¼ in. thru 6 in. .. 50.0
Longer than 6 in. .. 37.0
⅝ in., 3 in. & shorter 47.0
3¼ in. thru 6 in. .. 40.0
Longer than 6 in. .. 31.0
¾ in. thru 1 in.:
6 in. and shorter .. 37.0
Longer than 6 in. .. 31.0
1⅛ in. and larger:
All lengths 31.0
Undersize Body (rolled thread)
½ in. and smaller:
3 in. and shorter .. 55.0
3¼ in. thru 6 in. .. 50.0

Carriage Bolts

Full Size Body (cut thread) & Undersize Body (rolled thread)
½ in. and smaller:
6 in. and shorter .. 48.0
Larger diameters and longer lengths 35.0

Lag, Plow, Tap, Blank, Step, Elevator, Tire, and Fitting Up Bolts

½ in. and smaller:
6 in. and shorter .. 48.0
Larger diameters and longer lengths 35.0

High Tensile Structural Bolts

(Reg. semifinished hex head bolts, heavy semifinished hex nuts. Bolts — High-carbon steel, heat treated. Spec. ASTM A-325, in bulk. Full keg quantity)

⅝ in. diam.	50.0
¾ in. diam.	47.0
⅞ and 1 in. diam.	43.0
1⅛ and 1¼ in. diam.	34.0

NUTS

(Keg or case quantity and over)

Square Nuts, Reg. & Heavy:
All sizes 56.0
(Full container)

Hex Nuts, Reg. & Heavy

Hot Pressed & Cold Punched:

¾ in. and smaller..	62.0
⅞ in. to 1⅛ in., incl.	56.0
1⅛ in. and larger..	51.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller..	62.0
⅞ in. to 1⅛ in., incl.	56.0
1⅛ in. and larger..	51.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

⅝ in. and smaller..	62.0
¾ in. to ⅞ in., incl.	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger..	51.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Cap Screws, Coarse or Fine Thread, Bright:

6 in. and shorter:

¼ in. and smaller..	35.0
⅝, ⅞, and 1 in. ..	16.0
Longer than 6 in.:	
⅝ in. and smaller..	3.0
⅞, ⅞, and 1 in. ..	+11.0

High Carbon, Heat Treated:

6 in. and shorter:

⅝ in. and smaller..	20.0
¾, ⅞, and 1 in. ...	+ 5.0
Longer than 6 in.:	
⅝ in. and smaller..	+19.0
¾, ⅞, and 1 in. ...	+39.0

Flat Head Cap Screws:

¼ in. and smaller, 6 in. and shorter .. +85.0

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:

6 in. and shorter...	+ 5.0
Longer than 6 in. ...	+29.0

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
⅞ in. and smaller by 6 in. and shorter: 15.0%.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$32.15	$48.20	$61.55	$81.10	$105.65
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	32.15	48.20	61.55	81.10	105.65
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	....	43.40	55.40	73.00	....
Pueblo,Colo. W12	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Rails				
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	....
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.50
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.22
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	7.025
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh P14	14.75
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2,Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.635c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in and smaller rounds; 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+7.75
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	0.5	+28	+11.5	+37	+22	+45.5	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.25	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on current price of zinc (11.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	40.00	42.00	39.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	40.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	41.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	42.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	44.50	57.00	57.00
303	....	32.00	41.00	46.00	45.50	48.00	45.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	45.75	55.00	55.00
304L	....	....	48.25	51.50	53.00	55.50	53.50	63.25	63.25
305	28.50	36.75	42.50	47.50	45.25	47.75	46.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	55.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	66.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	87.75	96.75	96.75
314	....	....	77.50	....	86.50	91.00	87.75	99.00	104.25
316	39.75	49.50	62.25	69.25	69.25	73.00	71.75	80.75	80.75
316L	....	55.50	70.00	76.50	77.00	80.75	79.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	88.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	54.75	65.50	65.50
330	....	....	118.75	....	132.00	138.50	135.50	149.25	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	64.75	79.25	79.25
403	....	....	28.25	....	32.00	33.75	30.00	40.25	40.25
405	19.50	25.50	29.75	36.00	33.50	35.25	32.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	30.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	31.25	48.25	48.25
420	26.00	33.50	34.25	41.75	39.25	41.25	40.25	62.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	31.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	31.75	51.75	51.75
431	....	28.75	37.75	....	42.00	44.25	41.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	42.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp., Washington Steel Corp.

Clad Steel

Stainless	Plates: 5% Carbon Base	10% Carbon Base	15% Carbon Base	20% Carbon Base	Sheets: 20% Carbon Base
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	34.75	40.65

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3, nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	W-Cr Hot Work (H-12)	0.530
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

YOUR INTRODUCTION TO A SPECIALIST IN STAINLESS STEEL FASTENERS . . .

We, at Allmetal, offer immediate delivery for your Stainless Steel Fastener needs.

Thirty years of "Know How" specializing in the manufacturing of Stainless Steel Fasteners is the best answer to your fastener problems. We are constantly alerted to maintain the type and quality of Stainless Steel Fasteners you require for production. Do not hesitate to inform us as to your full requirements.

Write on your company letterhead for latest catalog. This too, automatically places you on our mailing list.

ALLMETAL

C ELECTRIC FURNACE STEEL CASTINGS

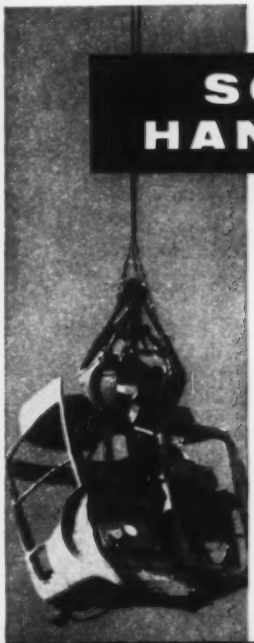
are engineered to *YOUR* specific requirements

"C" steel castings are CLEAN steel castings of uniform structure that will minimize machining and assembly costs, permit of greater freedom and efficiency of design and add to your product the recognized strength, endurance and desirability of steel. C steel castings, foundry engineered from pattern to finished casting can be had in

CARBON, ALLOY OR STAINLESS STEEL SAND OR SHELL MOULDED

The technical experience and knowledge of our engineering staff are at your service. Write, phone, or call.

CRUCIBLE STEEL CASTING CO.
LANSDOWNE 2, PENNA.



SCRAP HANDLING

the easy way with . . .

OWEN GRAPPLES

OWEN grapples act like a giant hand, with each finger or tine closing independently of the others. Because of this exclusive patented independent tine action, each tine does its full share . . . **all four tines are always in contact with the material.**

Write today for free catalog.

The OWEN BUCKET Co.
BREAKWATER AVENUE, CLEVELAND 2, OHIO
BRANCHES New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.50*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago, Ill., R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	68.00	68.50	69.00	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	68.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% and $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, $9 freight allowed K2	103.50
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Troy, N.Y. R2 (Phos. 0.035% max)	73.00
Philadelphia, deld.	81.67
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Steel Service Center Products

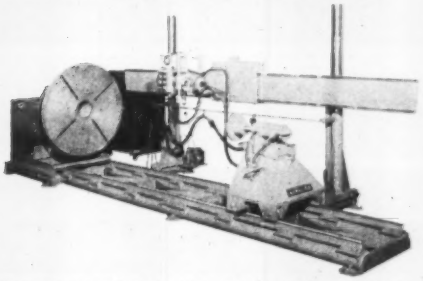
Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Galv. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	8.59§	9.86‖	10.13	....	8.91	9.39	13.24#	....	9.40	9.29	11.21
Baltimore	8.55	9.25	9.99	....	9.05	9.45	11.85#	15.48	9.55	9.00	10.50
Birmingham	8.18	9.45	10.46	....	8.51	8.99	....	....	9.00	8.89	10.99
Boston	9.31	10.40	11.39	53.50	9.73	10.11	13.39#	15.71	10.01	10.02	11.85
Buffalo	8.40	9.60	10.85	55.98	8.75	9.15	11.45#	15.40	9.25	9.20	10.75
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.25	9.45	10.50	53.00	8.51	8.99	9.15	15.05	9.00	8.89	10.20
Cincinnati	8.43	9.51	10.55	53.43	8.83	9.31	11.53#	15.37	9.56	9.27	10.53
Cleveland	8.36	9.54	10.65	52.33	8.63	9.10	11.25#	15.16	9.39	9.13	10.44
Dallas	8.80	9.30	....	....	8.85	8.80	....	....	8.75	9.15	10.40
Denver	9.40	11.84	12.94	....	9.43	9.80	11.19	....	9.84	9.76	11.08
Detroit	8.51	9.71	10.87	56.50	8.88	9.30	9.51	15.33	9.56	9.26	10.46
Erie, Pa.	8.20	9.45	9.95[10]	....	8.60	9.10	11.25	....	9.35	9.10	10.60
Houston	8.40	8.90	10.29	52.00	8.45	8.40	11.60	15.75	8.35	8.75	10.10
Jackson, Miss.	8.52	9.79	....	....	8.84	9.82	10.68	....	9.33	9.22	11.03
Los Angeles	8.70[2]	10.80[2]	12.15[2]	57.60	9.15	9.10[2]	12.95[2]	16.35	9.00[2]	9.10[2]	11.30[2]
Memphis, Tenn.	8.59	9.80	....	....	8.84	9.32	11.25#	....	9.33	9.22	10.86
Milwaukee	8.39	9.59	10.64	....	8.65	9.13	9.39	15.19	9.22	9.03	10.34
Moline, Ill.	8.55	9.80	....	....	8.84	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	11.10	53.08	9.64	9.99	13.25#	15.50	9.74	9.77	11.05
Norfolk, Va.	8.40	....	....	....	9.10	9.10	12.00	....	9.40	8.85	10.35
Philadelphia	8.20	9.25	11.34	52.71	9.25	9.40	11.95#	15.48	9.10	9.15	10.40**
Pittsburgh	8.35	9.55	10.90	52.00	8.61	8.99	11.25#	15.05	9.00	8.89	10.20
Richmond, Va.	8.40	....	10.40	....	9.10	9.00	....	....	9.40	8.85	10.35
St. Louis	8.63	9.83	10.88	....	8.89	9.37	9.78	15.43	9.48	9.27	10.58
St. Paul	8.79	10.04	11.09	....	8.84	9.21	9.86	....	9.38	9.30	10.49
San Francisco	9.65	11.10	11.00	55.10	9.75	10.15	13.00	16.00	9.85	10.00	12.35
Seattle	10.30	11.55	12.50	56.52	10.25	10.50	14.70	16.80[3]	10.20	10.10	12.50
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	10.35	11.55	12.55	57.38	10.80	11.05	14.70	16.80	10.25	10.15	13.05
Washington	9.15	....	....	....	9.65	10.05	12.50	....	10.15	9.60	11.10

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **⅛ in. and heavier; ††as annealed; ‡‡¾ in. to 4 in. wide, inclusive; #net price, 1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-finished bars, 2000 lb and over except in Seattle, 2000 to 3999 lb; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Seattle, 30,000 lb and over; [2]—30,000 lb; [3]—1000 to 4999 lb; [5]—1000 to 1999 lb; [10]—2000 lb and over.

Airline MODEL 20420 Combination Longitudinal and Circumferential TIG Welding Machine



This Airline unit is equipped with a powered tilting 2500 lb. capacity weld positioner. The turntable is driven with an infinitely variable speed drive and provides a speed range of from 0 to 2 rpm.

This Airline welding machine is equipped with a moveable tailstock and pneumatically actuated quill.

120" headstock to tailstock working clearance.

The precision side beam track for welding head and carriage may be hydraulically raised or lowered for approximate torch positioning. The welding torch is equipped with vernier vertical and lateral adjustments. The carriage is power driven for horizontal traversing at reproducible speeds of from 4 to 88 inches per minute.

Request Airline Bulletin 557 describing other Airline longitudinal and circumferential welding positioners.

Airline WELDING & ENGINEERING
760 NO PRAIRIE AVE HAWTHORNE, CALIFORNIA
OSBORNE 5-2225 OSBORNE 5-3156 OREGON 8-5112

★ . . . for any information about bearings and bearing metals, consult with the A. W. Cadman Mfg. Co., master makers of fine bearing metals since 1860.

PITTSBURGH ..... 28th and Smallman Streets
PHILADELPHIA ..... 18 W. Chelten St.
CHICAGO ..... Manhattan Bldg.
NEW YORK ..... 150 Nassau St.

DYKEM STEEL BLUE
Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2303H North 11th St. • St. Louis 6, Mo.

Moltrup
CLOSE-TOLERANCE STEEL PRODUCTS SINCE 1892

MACHINE KEYS
WOODRUFF KEYS
SPECIAL KEYS
MACHINE RACK
•
TAPER PINS
STRAIGHT PINS
KNURLED PINS
SPECIAL PINS

Close tolerances mean better results for MOLTRUP customers. No chattering — no misfits — no wasted time. Special keys and pins made to your specifications — the exact tolerances ordered.

KEYS: Gib Head, Feather, H-P, Woodruff, and all other types. PINS: Taper, Threaded Taper, Dowel, Knurled, any other type desired. Made from fine steel screw stock, Monel, brass, aluminum, or other metals. MOLTRUP'S modern high-speed production combines precision quality with low cost.

COLD DRAWN STEEL
All standard shapes — any special shape . . . carbon — alloy — leaded steels . . . close-tolerance key stock.

We invite consultation on your problems. — Try us for emergency needs.
Phone: TIlden 6-3100
(See telephone directory in cities listed)

Moltrup Steel Products Co.
BEAVER FALLS, PA.

Pittsburgh, Pa. Bala Cynwyd, Pa. Erie, Pa. Chicago, Ill.
Detroit, Mich. New York, N. Y. Syracuse, N. Y. Cincinnati, O.
Cleveland, O. Los Angeles, Calif.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchens, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $168; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $145; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $30-$33, contract; Mexican, all rail, duty paid, $25; barge, Brownsville, Tex., $27.

Ores

Lake Superior Iron Ore

(Prices effective for the 1958 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	18.00-19.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: deld. east of Mississippi River, ocean bags 23,000 lb and over..	11.25
F.o.b. Riverton or Camden, N. J., west of Mississippi River.	9.50
Sponge Iron, Domestic, 98% Fe: Deld. east of Mississippi River, 23,00 lb and over	11.25
100 mesh	9.10
40 mesh	8.10
Electrolytic Iron, Melting stock, 99.87% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.75
(In contract lots of 240 tons price is 22.75c)	
Annealed, 99.5% Fe..	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh	
Aluminum: Atomized, 500-lb drum, freight allowed Carlots	38.50
Ton lots	40.50
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	33.00-48.90†
Bronze, 5000-lb lots	49.60-53.70†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	74.00
Nickel-Silver, 5000-lb lots	50.99-55.40†
Phosphor-Copper, 5000-lb lots	61.80
Copper (atomized) 5000-lb lots	42.30-50.80†
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.07
Stainless Steel, 316	$1.26
Tin	14.00*
Zinc, 5000-lb lots	19.00-32.20‡
Tungsten: Melting grade, 99% 60 to 200 mesh, nominal:	Dollars
1000 lb and over	3.15
Less than 1000 lb	3.30
Chromium, electrolytic 99.8% Cr, min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5⅛	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries.)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.10	$5.10	$5.00	$5.45
Bar Size Angles	5.00	5.00	4.90	5.33
Structural Angles	5.00	5.00	4.90	5.33
I-Beams	5.06	5.06	4.96	5.40
Channels	5.06	5.06	4.96	5.40
Plates (basic bessemer)	6.62	6.62	6.62	6.94
Sheets, H.R.	8.20	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	8.75	8.75	8.75	9.12
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.71	25.59	25.59	26.46
Barbed Wire (†)	6.60	6.60	6.60	6.95
Merchant Bars	5.40	5.40	5.35	5.90
Hot-Rolled Bands	7.15	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	5.15	5.28	5.10	5.45
Wire Rods, O.H. Cold Heading Quality No. 5	6.05	6.18	6.00	6.30
Bright Common Wire Nails (‡)	7.89	7.75	7.67	8.26

†Per 82 lb net reel. ‡Per 100-lb kegs, 20d nails and heavier.

ARE YOU HAVING EXCESSIVE MACHINING LOSSES CAUSED BY DEFECTIVE CASTINGS?

WRITE MR. G. A. HALSEY ABOUT OUR PLAN GUARANTEEING YOU QUALITY PRESSURE-TIGHT BRONZE AND ALUMINUM CASTINGS READY FOR MACHINING

OPW CORPORATION Valves • Fittings • Assemblies for handling hazardous liquids

2735 COLERAIN AVE. • CINCINNATI 25, OHIO • KIrby 1-5400

OPW CORPORATION VALVES • FITTINGS • ASSEMBLIES OPW FOR HANDLING HAZARDOUS LIQUIDS CINCINNATI 25, OHIO

STRAIGHTEN AND CUT WIRE UP TO 500 FPM

This is the most outstanding development in the field . . . the new Lewis No. 4FHA Wire Straightening and Cutting Machine designed to straighten and cut wire in any lengths at speeds up to 500 FPM.

Through the use of a compound sliding-gear transmission 24 gear combinations permit 20 feed speeds — 75 through 520 FPM with 6 flywheel speeds of 95 through 305 RPM. Another outstanding feature is the Dual-Center Straightener Arbor (Pat. Pending) permitting the use of close centers for small diameters and long centers for the larger diameters thus making possible precision straightening over the entire range of the machine.

Lewis No. 4FHA Travel-Cut Automatic High-Speed Flying-Shear Wire Straightening and Cutting Machine with Wichita Air Clutch and Air Brake.

Capacity: Mild Steel 3/32" to 1/4" diameter. High Carbon, Alloy & Stainless 3/16" Maximum.

Other models up to 1"

THE LEWIS MACHINE COMPANY

3441 EAST 76TH STREET • CLEVELAND 27, OHIO

IMPERIAL

MANUFACTURERS' WIRE— Carbon, Stainless & Alloy Steels

- The uniform excellence of wire bearing this label reflects the skill of metallurgical engineers and craftsmen specially trained in the art of wire making.
- Precision quality wire has been our exclusive business for more than 50 years.

INDIANA STEEL & WIRE CO., INC.

Dept. M, MUNCIE, INDIANA

INTRODUCTION TO THE STUDY OF HEAT TREATMENT OF METALLURGICAL PRODUCTS

By Albert Portevin

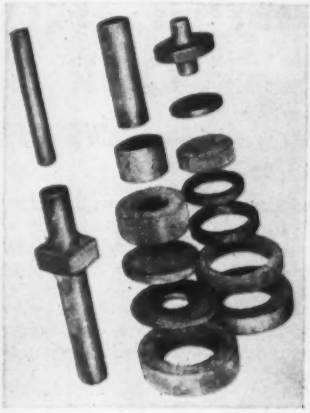
Fundamental knowledge and essential principles of heat treatment of steel are presented in simple and understandable manner. Research engineers, metallurgical students and steel plant metallurgists engaged in metallurgical investigations and the heat treatment of ferrous and non-ferrous metals will find this book of inestimable value.

246 pages **4 tables**
69 illustrations **Price $5.00 Postpaid**

THE PENTON PUBLISHING CO.

Book Department, 1213 W. 3rd St., Cleveland 13, O.

STRENGTH and ECONOMY ASSURED THROUGH FLAT-DIE FORGINGS!



Typical examples of flat die forgings.

Combining the time-proved advantages of forged strength, minimum stock allowance and versatility in materials selection, flat die forgings mean real savings and satisfaction — for experimental parts or short run production.

For prompt service, or our technical "know how," call or write:

COMPOSITE FORGINGS, INC.

2300 W. JEFFERSON, DETROIT 16, MICH.

Phone TAshmoo 5-3226

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Neville Island, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively. (Mn 79-81%). Lump $253 per net ton f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.5% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Mn carload, bulk, 33.25c; 2000 lb to min carload, 36c; less ton, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% grade, Si 15-17%, deduct 0.2c from above prices. For 3% grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $240 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $245.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $290 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $295.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.

Cr 67-71%, carload, lump, bulk, C 0.02% Max 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 61-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload packed 8M x D, 21.25c per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42.45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 28.25c per lb contained Cr, 14.60c per lb contained Si, 0.75" x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade, (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Contract, carload, lump, bulk, 14.6c per lb of contained Si. Packed c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing min 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

Only **ONE** manufacturer can

STEAL this STEEL FABRICATING CO.

will **YOUR** company be the **ONE?**

SAVE $1,000,000 (40%)

This is the last of the unabsorbed, well known, privately owned companies that began during the early days of California. Owner's desire to reduce his work load provides this opportunity at a time when the California Boom is just shifting into high gear. The chain reaction of population increase is developing a tremendous market for almost every type of product.

California is the Headquarters for the Missile Industry; the entire West has huge programs for water and power; Atomic energy is building up a full head of steam; and the expansion of other industries, including transportation, construction, and chemical, stagger the imagination.

All of these and many more are customers of this facility.

Owner is flexible: can merge, sell assets, lease, or sell equipment and lease land and buildings.

Excellent financing available.

Ask for: Robert W. Eberle

W. Ross Campbell Co.
712 So. Spring St.,
Los Angeles 14, Calif.

Phone: MAdison 7-9911

Scrapmen Expect First Quarter Rise

STEEL's composite on the prime grade holds unchanged at $39.66 at start of new year, but rising steelmaking operations will put new strength into the market

Scrap Prices, Page 460

Pittsburgh—Prices are firmer following the recent mill purchase of more than 20,000 tons of scrap to be shipped this month. No. 1 heavy melting is quoted at $43; No. 2 heavy melting at $36; No. 2 dealer bundles, $32.

Sellers expect the rising trend to continue as the mills step up operations.

Bidding on railroad and industrial lists is expected to be brisk this month, but dealers think price increases will be modest because of the large tonnages offered.

Chicago—Yearend activity in the scrap market was at low ebb, with buying extremely light and prices stable. Ordering is so scant the market isn't getting a thorough test. Material is in abundant supply, and eight steel plant blast furnaces are idle; both factors tend to subdue optimism of scrap dealers and brokers for the early weeks of the new year.

Cleveland—On the basis of a bid of $42.50 on an automotive list of 115 cars, the price of factory bundles should be $44-$45, delivered. But brokers feel this bid is not representative of the market, especially with other lists about to be closed. Since there is no consumer buying to determine the level of delivered prices, quotations are unchanged but nominal on the basis of heavy melting at $38.50-$39.50, Cleveland, and $42-$43, Valley.

Buffalo—Holiday influences slowed trading to a walk. Prices are steady, and sentiment appears to be a little stronger. Some market observers think quotations might go up a little this month, largely because of higher prices at other consuming points.

Youngstown—The market is dull here. No new orders have appeared, and none are in sight. Dealers are hopeful that rising steel demand may force steelmakers to resume buying scrap to support furnace operations.

Cincinnati—A stronger tone is developing in the market. New strength is expected to show up in bidding on industrial lists. Some new mill buying is anticipated. Prices are unchanged, but there's some talk that brokers' buying prices on the principal steelmaking grades may be raised $1.

St. Louis—There was virtually no activity in this market over the holidays. Some pickup in buying is expected this month, and dealers are hoping for a price advance.

Houston—The local mill entered the market just before the year ended for a limited tonnage of January delivery scrap at prices sharply down from those paid in November. Result: Broker buying prices dropped as much as $7 a ton on No. 1 heavy melting.

No Gulf export buying is projected this month. Mexican demand for Texas scrap is limited to small tonnages of low priced No. 2 bundles.

Birmingham — Scrap consumers are not expected to resume buying until the middle of this month. Tonnage on old orders will continue to move. Virtually all market factors anticipate lower prices when buying resumes. A strike at the Atlanta steel mill continues. The export market is quiet.

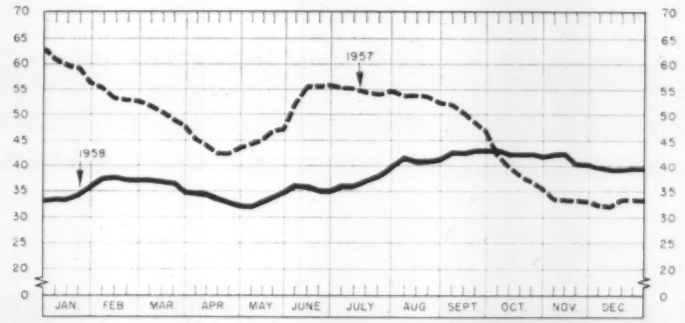
Los Angeles — Prices are unchanged, but they show signs of softening. Some dealers anticipate a $2 to $3 decline this month. Five or six cargoes are expected to sail for Japan from this port during the first quarter.

Seattle—Dealers are hoping for an upturn in demand over coming weeks, but current steelmaking operations do not offer much encouragement. Large consumers are well stocked, so that any upswing in steelmaking would not force them to start buying scrap in volume.

San Francisco — There's little movement of scrap here, except for tonnage committed for export. As a result, the price structure is uncertain, and there is considerable doubt that current quotations will hold.

STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania—Compiled by STEEL.



Dec. 31 1958	Week Ago	Month Ago	Year Ago	Nov. Avg
$39.66	$39.66	$40.33	$33.17	$41.42

Scrap's Outlook Brighter

Improved prospects for steel production in 1959 encourage scrapmen to anticipate substantial improve-

(*Please turn to Page* 466)

COVERED HOT TOP BRICK
INGOT MOLD PLUGS

EUREKA
FIRE BRICK WORKS
MT. BRADDOCK, FAYETTE CO., PA.
DUNBAR, PA. BR-7-4213

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 31, 1958. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 31	$39.66
Dec. 24	39.66
Nov. Avg.	41.42
Dec. 1957	32.77
Dec. 1953	36.99

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	35.00-36.00
No. 1 dealer bundles	43.00-44.00
No. 2 bundles	31.00-32.00
No. 1 busheling	42.00-43.00
No. 1 factory bundles	46.00-47.00
Machine shop turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings	25.00-26.00
Cast iron borings	25.00-26.00
Cut structurals:	
2 ft and under	47.00-48.00
3 ft lengths	46.00-47.00
Heavy turnings	34.00-35.00
Punchings & plate scrap	47.00-48.00
Electric furnace bundles	47.00-48.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	41.00-42.00
Unstripped motor blocks	31.00-32.00
Clean auto cast	39.00-40.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	44.00-45.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Random rails	53.00-54.00
Railroad specialties	48.00-49.00
Angles, splice bars	48.00-49.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	225.00-230.00
18-8 turnings	125.00-130.00
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt, indus.	43.00-44.00
No. 1 heavy melt dealer	41.00-42.00
No. 2 heavy melting	35.00-36.00
No. 1 factory bundles	46.00-47.00
No. 1 dealer bundles	42.00-43.00
No. 2 bundles	29.00-30.00
No. 1 busheling, indus.	43.00-44.00
No. 1 busheling, dealer	*41.00-42.00*
Machine shop turnings	21.00-22.00
Mixed borings, turnings	23.00-24.00
Short shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Cut structurals, 3 ft	47.00-48.00
Punchings & plate scrap	48.00-49.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	43.00-44.00
Unstripped motor blocks	37.00-38.00
Clean auto cast	52.00-53.00
Drop broken machinery	52.00-53.00

Railroad Scrap

No. 1 R.R. heavy melt	45.00-46.00
R.R. malleable	57.00-58.00
Rails, 2 ft and under	58.00-59.00
Rails, 18 in. and under	59.00-60.00
Angles, splice bars	54.00-55.00
Axles	69.00-70.00
Rails, rerolling	62.00-63.00

Stainless Steel Scrap

18-8 bundles & solids	215.00-220.00
18-8 turnings	115.00-120.00
430 bundles & solids	115.00-120.00
430 turnings	45.00-50.00

YOUNGSTOWN

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	29.00-30.00
No. 1 busheling	42.00-43.00
No. 1 bundles	42.00-43.00
No. 2 bundles	29.00-30.00
Machine shop turnings	15.00-16.00
Short shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos	43.00-44.00
Electric furnace bundles	43.00-44.00

Railroad Scrap

N. 1 R.R. heavy melt.	44.00-45.00

CLEVELAND

No. 1 heavy melting	38.50-39.50
No. 2 heavy melting	25.00-26.00
No. 1 factory bundles	43.00-44.00
No. 1 bundles	38.50-39.50
No. 2 bundles	28.50-29.50
No. 1 busheling	38.50-39.50
Machine shop turnings	14.00-15.00
Short shovel turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Cast iron borings	20.00-21.00
Cut foundry steel	39.00-40.00
Cut structurals, plates 2 ft and under	47.00-48.00
Low phos, punching & plate	40.00-41.00
Alloy free, short shovel turnings	22.00-23.00
Electric furnace bundles	39.00-40.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	37.00-38.00
Heavy breakable cast	36.00-37.00
Stove plate	43.00-44.00
Unstripped motor blocks	32.00-33.00
Brake shoes	36.00-37.00
Clean auto cast	49.00-50.00
Burnt cast	33.00-34.00
Drop broken machinery	49.00-50.00

Railroad Scrap

R.R. malleable	63.00-64.00
Rails, 2 ft and under	57.00-58.00
Rails, 18 in. and under	58.00-59.00
Rails, random lengths	52.00-53.00
Cast steel	49.00-50.00
Railroad specialties	50.00-51.00
Uncut tires	43.00-44.00
Angles, splice bars	50.00-51.00
Rails, rerolling	56.00-57.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-215.00
18-8 turnings	115.00-120.00
430 clips, bundles, solids	110.00-120.00
430 turnings	40.00-50.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	37.00
No. 2 heavy melting	35.00
No. 1 bundles	39.00
No. 2 bundles	27.00
No. 1 busheling	39.00
Machine shop turnings	18.50†
Short shovel turnings	20.50†

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	40.00
Heavy breakable cast	38.00
Unstripped motor blocks	39.00
Clean auto cast	48.00
Stove plate	44.00

Railroad Scrap

No. 1 R.R. heavy melt.	44.00†
Rails, 18 in. and under	51.00†
Rails, random lengths	47.50
Rails, rerolling	59.50
Angles, splice bars	47.00

BIRMINGHAM

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
No. 1 busheling	35.00-36.00
Cast iron borings	13.00-14.00
Machine shop turnings	21.00-22.00
Short shovel turnings	22.00-23.00
Bars, crops and plates	42.00-43.00
Structurals & plates	41.00-42.00
Electric furnace bundles	37.00-38.00
Electric furnace:	
2 ft and under	36.00-37.00
3 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	53.00-54.00
Stove plate	52.00-53.00
Unstripped motor blocks	40.00-41.00
Charging box cast	29.00-30.00
No. 1 wheels	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-39.00
Rails, 18 in. and under	49.00-50.00
Rails, rerolling	54.00-55.00
Rails, random lengths	44.00-45.00
Angles, splice bars	45.00-46.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 1 bundles	35.00
No. 2 bundles	24.50
No. 1 busheling	34.00
Electric furnace bundles	37.00
Mixed borings, turnings	18.00†
Short shovel turnings	21.00-22.00
Machine shop turnings	18.00
Heavy turnings	30.00
Structurals & plate	39.00-40.00
Couplers, springs, wheels	42.00-43.00
Rails, crops, 2 ft & under	56.00-57.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	41.00
Malleable	62.00
Drop broken machinery	48.00-49.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	27.00-28.00
No. 2 bundles	17.00-18.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	10.00-11.00
Short shovel turnings	13.00-14.00
Low phos. (structurals & plates)	33.00-34.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	185.00-190.00
18-8 borings, turnings	85.00-90.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	75.00-80.00

BUFFALO

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	33.00-34.00
No. 2 bundles	25.00-26.00
No. 1 busheling	33.00-34.00
Mixed borings, turnings	17.00-18.00
Machine shop turnings	15.00-16.00
Short shovel turnings	19.00-20.00
Cast iron borings	17.00-18.00
Low phos. structurals and plate, 2 ft and under	42.00-43.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	44.00-45.00
No. 1 machinery	48.00-49.00

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 3 ft and under	53.00-54.00
Railroad specialties	42.00-43.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	37.00-38.00
No. 2 bundles	25.00-26.00
No. 1 busheling	37.00-38.00
Machine shop turnings	18.00-19.00
Mixed borings, turnings	19.00-20.00
Short shovel turnings	21.00-22.00
Cast iron borings	19.00-20.00
Low phos, 18 in.	46.00-47.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Heavy breakable cast	38.00-39.00
Charging box cast	38.00-39.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00-43.00
Rails, 18 in. and under	55.00-56.00
Rails, random lengths	49.00-50.00

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	*33.00*
No. 2 heavy melting	*30.00*
No. 1 bundles	*33.00*
No. 2 bundles	*23.00†*
Machine shop turnings	17.00
Short shovel turnings	20.00
Low phos. plates & structurals	*39.00†*

Cast Iron Grades

No. 1 cupola	43.00
Heavy breakable	27.00-28.00†
Foundry malleable	37.00
Unstripped motor blocks	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00†*

BOSTON

(Brakers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	25.00-26.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	25.00-26.00
No. 1 busheling	25.00-26.00
Machine shop turnings	7.00-8.00
Short shovel turnings	10.00-11.00
No. 1 cast	33.00
Mixed cupola cast	33.00
No. 1 machinery cast	34.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	35.00-36.00
No. 2 bundles	22.00-23.00
No. 1 busheling	34.00-35.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	14.00-15.00
Short shovel turnings	15.00-16.00
Punching & plate	37.00-38.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	34.00-35.00
Charging box cast	34.00-35.00
Heavy breakable	35.00-36.00
Unstripped motor blocks	19.00-20.00
Clean auto cast	49.00-50.00

SEATTLE

No. 1 heavy melting	31.00
No. 2 heavy melting	29.00
No. 1 bundles	29.00
No. 2 bundles	23.00
Machine shop turnings	9.00-10.00†
Mixed borings, turnings	9.00-10.00†
Electric furnace No. 1	38.00†

Cast Iron Grades

No. 1 cupola	31.00†
Heavy breakable cast	28.00†
Unstripped motor blocks	23.00†
Stove plate (f.o.b. plant)	21.00†

LOS ANGELES

No. 1 heavy melting	33.00
No. 2 heavy melting	35.00
No. 1 bundles	34.00
No. 2 bundles	20.00
Machine shop turnings	15.00
Shoveling turnings	18.00
Cast iron borings	15.00
Cut structurals and plate 1 ft and under	48.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	47.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00

SAN FRANCISCO

No. 1 heavy melting	32.00-34.00
No. 2 heavy melting	30.00-32.00
No. 1 bundles	30.00-32.00
No. 2 bundles	22.00
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Short shovel turnings	15.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	44.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.*

No. 1 heavy melting	34.50
No. 2 heavy melting	30.50
No. 1 bundles	34.50
No. 2 bundles	25.00
Mixed steel scrap	26.50
Mixed borings, turnings	15.00
Busheling, new factory: Prepared	34.50
Unprepared	28.50
Short steel turnings	19.00

Cast Iron Grades‡

No. 1 machinery cast	39.00-41.00

*Brokers' buying prices.
†Nominal.
‡F.o.b. Hamilton, Ont.

THE NEW LOGEMANN MODEL 500-PF HIGH SPEED SCRAP PRESS

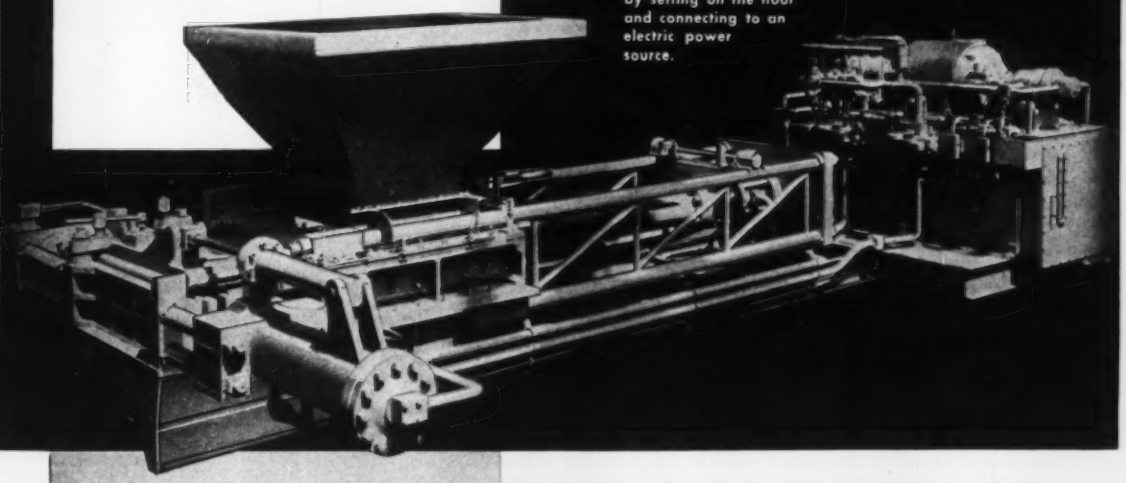
FAST LOADING! FAST BALING! FAST DISCHARGE!

Here is a two-compression, side-ejection press designed for high production — up to 240 bales per hour.

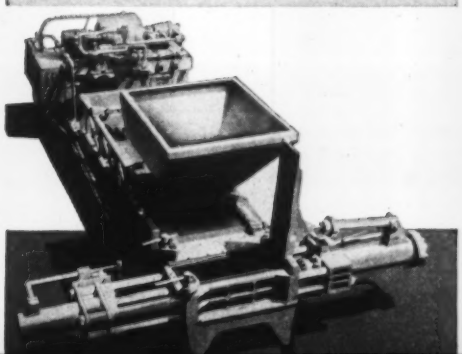
It is able to bale sheet clips, stamping skeletons, wire, cans, steel, copper, brass and aluminum scrap.

The LOGEMANN Model 500-PF press is a high-speed, high-density horizontal two compression unit. It is filled from a hopper supermounted above the compression box and discharges the compressed bale through a side opening. The operating cycle is automatic and continuous, or manual at the option of the operator.

No pit required for installation. Can be operated by setting on the floor and connecting to an electric power source.



BALE SIZE	6" x 12" x 8" (VARIABLE)
BALE WEIGHT	40 LBS. AVERAGE
PRODUCTION	UP TO 240 BALES PER HOUR



Designed for HIGH PRODUCTION

Here is a new high speed scrap press . . . geared for high production and extra baling profits for you. Famous "engineered" features, proved through actual operation, are built into this press to give you constant, uninterrupted service. It's a top-loading side-ejection press that can handle a variety of scrap. Write for the new Bulletin No. 220; it will give you complete information concerning design, pumping unit, valve assembly and accessory equipment. When making your inquiries please state the nature of your scrap and the tonnage desired.

LOGEMANN BROTHERS CO.

3126 W. BURLEIGH STREET • MILWAUKEE 45, WISCONSIN

Metalmen See Good Year

Here's what to expect: Demand will go up; prices will be more stable than in prior years. Supplies will be adequate although it may take longer to get orders filled

Nonferrous Metal Prices, Pages 464 & 465

PRODUCERS of nonferrous metals haven't been so optimistic in months. They've just come through one of their best fourth quarters in history and have little reason to expect a slowup in 1959. If the economy forges ahead at predicted levels over the next 12 months, over-all industry sales will equal those of 1957.

A few metals stand a fighting chance of bettering the 1957 mark.

Even the pessimists admit 1959 won't be a dull year. Here's a run-down on what to expect:

Copper

• **Output**—Look for Free World refined production to rise sharply. It could go to around 3.3 million tons, vs. an estimated 2.75 million tons in 1958. Most U. S. mines are operating at capacity, and the increased output should begin to be felt in the market soon. This country may have to import up to 250,000 tons of blister or refined copper in 1959 to meet demand.

• **Business** — Overseas sales will hold at close to 1958 levels with a slight chance of a mild dropoff. It's a different story in the U. S. Estimates peg American shipments at 10 to 20 per cent better than 1958's. Look for foreign sales to approach the 1.7 million ton mark estimated for 1958. U. S. sales should be around 1.4 million tons, compared with an estimated 1.2 million tons in 1958.

• **Supply**—With a stepup in both supply and demand anticipated, the 1959 copper market should be pretty well balanced. It's doubtful if producers' stocks will go much lower —they're now close to what's considered to be minimum working levels. Don't be surprised if you have to allow for a little more leadtime on orders.

• **Price**—Adequate supplies and a fairly stable business picture should protect consumers from the price flip-flops of the past. Outlook: Stability, with the price probably rising to 30 cents a pound during the year. Keep one factor in mind: Most producers have labor contracts that terminate in 1959. A prolonged strike would bring a shortage and price gyrations similar to those of 1954.

Aluminum

• **Output**—U. S. primary production in 1959 should hit at least 1.7 to 1.8 million tons, vs. an estimated 1.55 million tons in 1958. Secondary recovery, which fell about 18 per cent to an estimated 380,000 tons in 1958, should also gain. Market conditions are still too hazy to forecast imports, but they should at least equal the 1958 estimate of 230,000 tons.

• **Business**—Forecasts peg a rise in consumption of 10 to 24 per cent this year. Besides the over-all business improvement, major reasons are the greater quantities going into cars (Kaiser says Detroit will increase usage by 50 per cent), more penetration of the housing field, and scores of new and expanded uses. (The industry plans to spend $30 million on research and development in 1959.) Here's another factor: Consumption in 1958 was better than shipments to consumers indicate (1.8 million tons shipped in 1958, compared with 1.925 million tons in 1957).

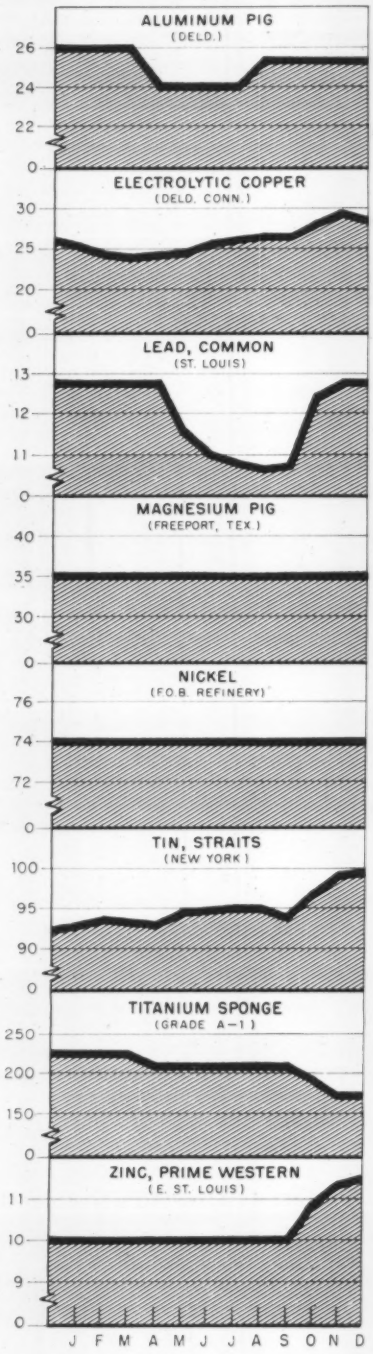
• **Supply**—Availability is more than adequate to meet demand. U. S. primary capacity is 2.15 million tons now and will rise to 2.45 million tons by the end of this year.

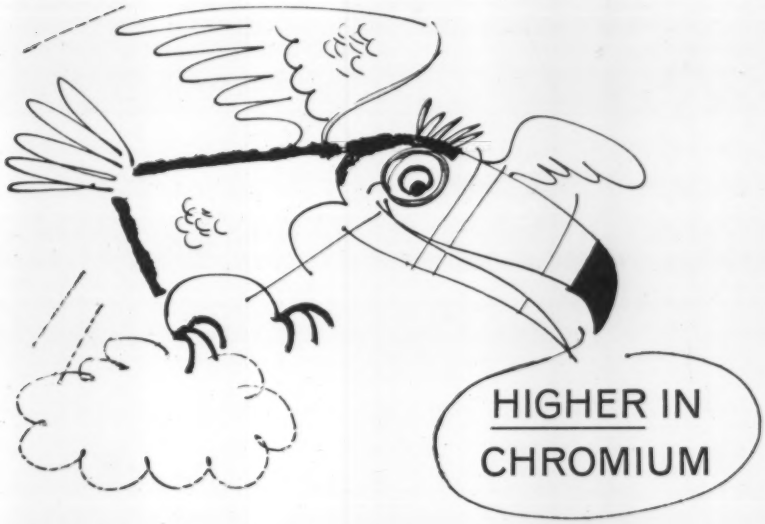
• **Price** — Producers have already guaranteed that there will be no price increases through the first half. If business is anywhere near present levels, you can expect a hike soon after midyear.

Next Week: Outlook for other nonferrous metals in 1959.

How Prices Went in '58

(Cents per pound)





EXLO® "75"

Now, from VCA's integrated, mine-to-mill facilities, come two new members of the EXLO ferrochromium family, with higher-than-ever chromium content (75% minimum) for use in very low carbon stainless steels and heat-resistant alloys. EXLO "75" is particularly adaptable to vacuum melting...and to other processes where maximum cleanliness is a *must!* Two grades of EXLO "75" to choose from:

Max. .015% Carbon Grade

Chromium	min. 75%
Carbon	max. 0.015%
Silicon	max. 0.75%

Max. .025% Carbon Grade

Chromium	min. 75%
Carbon	max. 0.025%
Silicon	max. 0.75%

AND BEAR IN MIND the *regular* EXLO grades for use in low carbon stainless and heat-resistant steels, irons and alloys. These, like all EXLO ferrochromium alloys, have high density and exceptional cleanliness.

Max. .025% Carbon Grade

Chromium	68/73%
Carbon	max. 0.025%
Silicon	max. 0.75%

Max. .05% Carbon Grade

Chromium	68/73%
Carbon	max. 0.05%
Silicon	max. 0.75%

Learn more about the substantial advantages of the whole EXLO family of fine high chromium—extra low carbon alloys. Call your VCA representative—or write us—today!

VANCORAM

VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue
New York 17, New York
Chicago • Cleveland • Detroit • Pittsburgh
Producers of alloys, metals and chemicals

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 24.70; ingots, 26.80, 30,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.60; No. 43, 28.40; No. 195, 29.40; No. 214, 30.20; No. 356, 28.60; 30 or 40 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 24.50-25.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.45 per lb deld.

Cobalt: 97.99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $55-85 per lb, nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-80 nom. per troy oz.

Lead: Common, 12.80; chemical, 12.90; corroding, 12.90, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, 9Z91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $221-224 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusion, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. points of entry, contained nickel, 69.60.

Osmium: $70-100 per troy oz nom.

Palladium: $15-17 per troy oz.

Platinum: $52-55 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 89.875 per troy oz.

Sodium: 17.00 c.l.; 19.00-19.50 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 98.75.

Titanium: Sponge, 99.3 + % grade A-1, ductile (0.3% Fe max.), $1.62-1.82; grade A-2 (0.5% Fe max.),$1.70 per lb.

Tungsten: Powder, 89.8%, carbon reduced, 1000-lb lots, $3.15 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $3.30-3.80.

Zinc: Prime Western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.50; special high grade, 12.75 deld. Diecasting alloy ingot No. 3, 14.00; No. 2, 14.25; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7 per lb; 100-500 lb, $6.50 per lb; over 500 lb, $6 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.875-25.25; No. 12 foundry alloy (No. 2 grade), 21.75-22.00; 5% silicon alloy, 0.60 Cu max., 24.75-25.00; 13 alloy 0.60 Cu max., 24.75-25.00; 195 alloy, 25.25-26.00; 108 alloy, 22.25-22.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.50; grade 2, 22.00; grade 3, 21.00; grade 4, 19.00.

Brass Ingot: Red brass, No. 115, 28.00; tin bronze, No. 225, 37.50; No. 245, 32.25; high-leaded tin bronze, No. 305, 32.25; No. 1 yellow, No. 405, 23.00; manganese bronze, No. 421, 24.75.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.885, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.865, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.35; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.54; l.c.l., 36.29.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $18.50 per cwt; pipe, full coils, $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $8.50-15.95; sheared mill plate, $6.00-9.50; wire, $6.50-10.50; forging billets, $3.80-4.35; hot-rolled and forged bars, $5.10-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 26.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H. R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100, 3003, and 5005 mill finish (30,000 lb base; freight allowed).

Thickness Range, Inches	Flat Sheet	Coiled Sheet
0.250-0.136	42.80-47.30	
0.136-0.096	43.20-48.30	
0.126-0.103		39.20-39.80
0.096-0.077	43.80-50.00	39.30-40.00
0.077-0.068	44.30-52.20	
0.077-0.061		39.50-40.70
0.068-0.061	44.30-52.20	
0.061-0.048	44.90-54.40	40.10-41.80
0.048-0.038	45.40-57.10	40.60-43.20
0.038-0.030	45.70-62.00	41.00-45.70
0.030-0.024	46.20-53.70	41.30-45.70
0.024-0.019	46.90-56.80	42.40-44.10
0.019-0.017	47.70-54.10	43.00-44.70
0.017-0.015	48.60-55.00	43.80-45.50
0.015-0.014	49.60	44.80-46.50
0.014-0.012	50.80	45.50
0.012-0.011	51.80	46.70
0.011-0.0095	53.50	48.10
0.0095-0.0085	54.60	49.60
0.0085-0.0075	56.20	50.80
0.0075-0.007	57.70	52.30
0.007-0.006	59.30	53.70

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in. 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.40	47.20
5050-F	43.50	48.30
3004-F	44.50	50.20
5052-F	45.10	50.90
6061-T6	45.60	51.70
2024-T4	49.30	56.10
7075-T6*	57.60	64.70

*24-48 in. width or diam., 72-180 in. lengths

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	76.90	73.90	....	....
0.250	62.00	60.20	89.10	76.60
0.375	61.20	60.00	73.50	68.50
0.500	61.20	60.00	73.50	68.50
0.625	61.20	60.00	69.80	64.20
0.750	59.70	58.40	63.60	60.40
0.875	59.70	58.40	63.60	60.40
1.000	59.70	58.40	63.60	60.40
1.125	57.30	56.10	61.50	58.30
1.250	57.30	56.10	61.50	58.30
1.350	57.30	56.10	61.50	58.30
1.500	57.30	56.10	61.50	58.30
1.625	55.00	53.60	....	56.20
1.750	55.00	53.60	60.30	56.20
1.875	55.00	53.60	....	56.20
2.000	55.00	53.60	60.30	56.20
2.125	53.50	52.10	....	....
2.250	53.50	52.10	....	56.20
2.375	53.50	52.10	....	....
2.500	53.50	52.10	....	56.20
2.625	....	50.40	....	....
2.750	51.90	50.40	....	56.20
2.875	....	50.40	....	....
3.000	51.90	50.40	....	56.20
3.125	....	50.40	....	....
3.250	....	50.40	....	....
3.375	....	50.40	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam. 0.375-8 in., "F" temper; 2014, 42.20-55.00; 6061, 41.60-55.00; 7075, 61.60-75.00; 7070, 66.60-80.00.

Pipe: ASA schedule 40, alloy 6063-T6 standard length, plain ends, 90,000 lb base, dollars per 100 ft. Nominal pipe sizes: ¾ in., 18.85 1 in., 29.75; 1¼ in., 40.30; 1½ in., 48.15; 2 in., 58.30; 4 in., 160.20; 6 in., 287.55; 8 in., 432.70.

Extruded Solid Shapes:

Factor	Alloy 6063-75	Alloy 6062-T6
9-11	42.70-44.20	51.30-55.50
12-14	42.70-44.20	52.00-56.50
15-17	42.70-44.20	53.20-58.20
18-20	43.20-44.70	55.20-60.80

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, .25-.30 in., 7300.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Copper and Brass: No. 1 heavy copper and wire, 22.50-23.00; No. 2 heavy copper and wire, 20.50-21.00; light copper, 18.25-18.75; No. 1 composition red brass, 16.50-17.00; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 29.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	53.13b	50.36c	....	58.39	25.000	25.000	24.250
Yellow Brass	46.57	31.22d	47.11	49.98	17.000	16.750	15.250
Low Brass, 80%	49.23	49.17	48.87	52.54	21.250	21.000	20.500
Red Brass, 85%	50.17	50.11	50.71	53.48	22.125	21.875	21.375
Com. Bronze, 90%	51.65	51.59	52.19	54.71	22.875	22.625	22.125
Manganese Bronze	54.98	48.58	59.08	....	17.750	17.500	16.875
Muntz Metal	49.35	44.66	....	....	17.875	17.625	17.125
Naval Brass	51.24	45.05	57.80	54.65	17.625	17.375	16.875
Silicon Bronze	58.27	57.46	57.81	75.95	24.625	24.625	23.625
Nickel Silver, 10%	62.20	66.60	64.03	....	23.875	23.625	11.937
Phos. Bronze	72.59	73.09	72.59	74.27	25.875	25.625	24.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting, e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-16.00; new brass clippings, 14.00-14.50; light brass, 10.50-11.00; heavy yellow brass, 11.50-12.00; new brass rod ends, 12.50-13.00; auto radiators, unsweated, 13.50-14.00; cocks and faucets, 13.50-14.00; brass pipe, 13.50-14.00.

Lead: Heavy, 8.25-8.75; battery plates, 3.25-3.75; linotype and stereotype, 10.50-11.00; electrotype, 9.00-9.50; mixed babbitt, 9.50-10.00.

Monel: Clippings, 30.00-31.00; old sheets, 27.00-28.00; turnings, 22.00-23.00; rods, 30.00-31.00.

Nickel: Sheets and clips, 52.00-55.00; rolled anodes, 52.00-55.00; turnings, 37.00-40.00; rod ends, 52.00-55.00.

Zinc: Old zinc, 4.00-4.25; new diecast scrap, 3.75-4.00; old diecast scrap, 2.50-2.75.

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 6.25-6.75; segregated low copper clips, 13.00-13.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.00-12.50; mixed high copper clips, 10.75-11.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.00-16.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.50-15.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.00; mixed low copper clips, 13.00-13.50; mixed high copper clips, 12.00-12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.00; light copper, 20.75; refinery brass (60% copper) per dry copper content, 22.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.00; light copper, 20.75; No. 1 composition borings, 18.50; No. 1 composition solids, 19.00; heavy yellow brass solids, 13.00; yellow brass turnings, 12.00; radiators 14.50.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.45.
Copper: Flat-rolled, 46.79; oval, 45.00; 5000-10,000 lb; electrodeposited, 38.50, 2000-5000 lb lots; cast, 41.00. 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 18.00; flat tops, 18.00; flats, 20.75; ovals, 20.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.45 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 14.65; 2000-5900 lb, 12.65; 6000-11,900 lb, 12.40; 12,000-22,900 lb, 12.15; 23,000 lb or more, 11.65.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,990 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 20.80; 400-800 lb, 19.80; 1000-19,800 lb, 18.80; 20,000 lb or more, 17.80.

Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10,000 lb or more, 62.80.

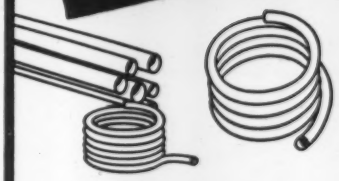
Stannous Chloride (anhydrous): 25 lb, 153.20; 100 lb, 148.30; 400 lb, 145.90; 800-19,900 lb, 106.00; 20,000 lb or more, 98.90.

Stannous Sulphate: Less than 50 lb, 138.40; 50 lb, 108.40; 100-1900 lb, 106.40; 2000 lb or more, 104.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

Series 2

PLUS ITEMS
from your Whitehead Metals "Supermarkets"



PLASTIC PIPE

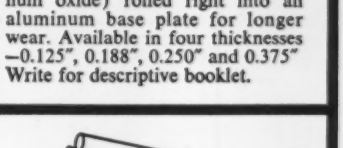
A full line of flexible and rigid plastic pipe and tubing in all commercial resins, in sizes from ⅛" to 4" OD. Fittings, cements and valves available from stock. Write for detailed literature.

NON-SKID ALUMINUM TREAD PLATE

Providing amazing gripping power (either oily or dry) this lightweight, corrosion resistant Alcoa product has a tough abrasive (fused aluminum oxide) rolled right into an aluminum base plate for longer wear. Available in four thicknesses —0.125", 0.188", 0.250" and 0.375" Write for descriptive booklet.

SHAFTING

Top quality shafting made of Monel, Tobin Bronze or Tempaloy. Originally developed for boats and other marine use, these shafts have gained wide industrial use in pumps and other machinery operating in corrosive atmospheres. Literature available.



WELDING FITTINGS

Stainless Steel forged welding fittings are stocked in I.P.S. sizes from ½" to 12" for Schedule 5S, 10S, 40S and 80S Pipe. All conventional shapes are on hand. Welding fittings are also stocked in Aluminum, Monel, Nickel and Inconel. Literature available.

DISSIMILAR METALS WELDING WIRE

A new item introduced at the 1958 Welding Show, Inco-Weld "A" Wire is a single product for inert gas welding of most combinations of dissimilar alloys. Technical Service and complete literature on request.

These "Plus Items" and many more are available in addition to a wide selection of corrosion-resistant sheet, rod and tube.

All told, there are more than 20,000 items distributed and serviced by Whitehead. All are available, off-the-shelf, from the nine Whitehead Metal "Supermarkets." All are the products of such leading producers as Alcoa, Anaconda, Inco & Crucible Steel to name just a few.

When you call Whitehead you get fast service, and frank, unbiased help in selection. Technical service when you need it. Add it up and you'll find it pays to

WHITEHEAD METALS, INC.

303 W. 10th St.
New York 14, N.Y.

Other Offices and Warehouses: Philadelphia • Buffalo • Harrison, N. J. Cambridge, Mass. • Syracuse • Baltimore • Rochester • Windsor, Conn.

FOR SALE

7000 gallon complete TANK CARS

Priced Attractively

Complete tank car or will remove tank. Can be inspected now at Kansas City.

Write • Wire • Phone

SONKEN-GALAMBA CORPORATION

2nd & Riverview
Kansas City, Kansas
ATwater 1-9305
X-358

GET CASH NOW

for your new surplus motors, controls and transformers!

AVAILABLE: NEW MOTORS

Over 5,000 new motors in stock from 1HP to 200 HP. Special low prices.

Write, wire or phone collect!

AJAX ELECTRIC MOTOR CORP
P.O. Box 262 Rochester, N.Y.
Long Distance Phone LD 132

WANT TO BUY

Steel By-Products Discs

2" to 2½"	Diameter .060 to .125
4½"	Diameter .060 to .125
6½" to 10"	Diameter .060 to .125
11" to 12½"	Diameter .085 to .095

Hot or Cold Rolled

KEYSTONE LAMP MFG. CORP.

Purchasing Department
Phone Slatington, Pa. POrter 7-3821

FERROUS METALLURGIST

Steel industry experience of 8-15 years with particular emphasis on utilization of iron ores and products. Should be familiar with sponge iron techniques or comparable methods of up-grading natural iron ores for direct use in open hearth or electric furnaces.

Initial duties would include technical evaluation or development of processes to upgrade iron ores and preparation of financial studies for facilities to produce one million tons per year of iron products suitable for steel making purposes.

Location: New York City executive office of mining company. Occasional U. S. and foreign travel required. Our staff knows of this position.

All replies held confidential.

Reply To Box 717, STEEL
Penton Bldg. Cleveland 13, Ohio

BRAZING—INDUCTION

Excellent opportunity for man experienced in developing and operating production induction brazing of stainless steel parts. New department in fast growing company manufacturing proprietary products.

Call or write Mr. Krasnoff,
Glen Cove 4-6320
PALL CORP.
Glen Cove, N. Y.

FOR CLASSIFIED RATES
And Further information write
STEEL, Penton Bldg., Cleveland 13, O.

(*Concluded from Page 459*)

ment in demand this year, says Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc.

Last year was the poorest for the scrap industry since 1946, despite a shortlived pickup in the early fall.

About 22 million gross tons of purchased scrap were consumed by domestic steel mills and foundries in 1958, vs. 29.6 million in 1957. Exports amounted to only 2.6 million tons, vs. 5.9 million during 1957, when an all-time high was registered.

Last year, the steel mills and foundries generated and remelted about 28 million tons of home scrap, vs. 36 million in 1957.

Total home scrap, plus purchased scrap, came to about 50 million tons, vs. about 66 million in 1957, a drop of 24 per cent.

The decline in use of pig iron during 1958 was about the same as that in scrap. So the percentages of scrap and pig iron charged into furnaces were roughly equal. In 1957, the scrap charge was 48.7 per cent and pig iron 51.3 per cent.

Use of home scrap increased during the year at the expense of purchased material. And improved technology operated against purchased scrap. Steel producers were less dependent on purchases to support furnace melts.

Pricewise, 1958 was a recession year for scrap. Average prices were lower, and the spread between heavy melting steel and No. 2 bundles increased greatly. Except for 1954, last year was the lowest price year since 1950.

CLASSIFIED

Accounts Wanted

MANUFACTURERS' REPRESENTATIVE of high caliber, long experience and wide acquaintance among steel consuming manufacturers in the area of Greater Cincinnati, Southern Ohio, Southern Indiana and Eastern Kentucky desires additional sales connection with substantial company. Items of a repeat nature wanted. Reply Box 720, STEEL, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVES

Salesmen currently selling joists, grating, or other allied products to the structural steel fabricators in Western Pennsylvania, Eastern Ohio, West Virginia and Eastern Seacoast States south of Virginia. Salesmen must be able to make take-offs from structural and architectural blueprints. In first reply please list items carried and exact territory covered. We are a specialty manufacturer selling the structural steel fabricators. Reply Box No. 721, STEEL, Penton Bldg., Cleveland 13, Ohio.

Structural Shapes . . .

Structural Shape Prices, Page 448

November bookings of fabricated structural steel were 242,635 tons, 7 per cent less than in the previous month, but 8000 tons greater than the average monthly tonnage in the first 11 months of the year, reports the American Institute of Steel Construction.

New orders in November marked the sixth successive month that bookings exceeded the comparable tonnage the year before.

Shipments in November were 271,000 tons, a 12 per cent drop from October. Total shipments in the first 11 months of the year were 3,397,647 tons, 12 per cent down from the like 1957 period.

The order backlog as of Nov. 30 was 1,838,860 tons. Of this total, 1,050,825 tons are scheduled for fabrication during the four months ending Mar. 31.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1530 tons, two seven-span rolled beam and welded girder bridges, Route 8, Thomaston-Litchfield-Harwinton, Conn., to Elizabeth Iron Works Inc., Elizabeth, N. J.; W. J. Megin Inc., Naugatuck, Conn., contractor.

1400 tons, building, United States mission to the United Nations, New York, to the Lafayette Iron Works, Jersey City, N. J.

1200 tons, trash racks, powerplant, Tuscarora, N. Y., awarded by the New York Power Authority to Kaustine Furnace & Tank Corp.

1060 tons, state bridgework, Rochester, N. Y., through the Grow Construction Co., New York, to the American Bridge Div., U. S. Steel Corp., Pittsburgh.

1000 tons, manufacturing building, Metro Glass Co., Carteret, N. J., to the Oltmer Iron Works, Jersey City, N. J.

730 tons, steel beams, naval shipyard, Bremerton, Wash., to Isaacson Iron Works, Seattle, $220,306.

715 tons, state bridgework, Ulster County, New York, through John Arborio Inc., general contractor, to the Harris Structural Steel Co., New York.

640 tons, Prospect Park observation tower, Niagara Falls, N. Y., to White Plains Iron Works, Peekskill, N. Y.

460 tons, state bridgework, Glen Cove, L. I., N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, motel, Tenth Avenue, between 49th and 50th Streets, Manhattan, New York, through Diesel Construction Co. to Simon Holland & Son Inc., Brooklyn, N. Y.

345 tons, baghouse and main flue, Laurel Hill plant (Long Island City, N. Y.), Phelps Dodge Mining Corp., New York, to Mineola Steel Fabricators, Mineola, Long Island, N. Y.

300 tons, structurals and bars, two state highway bridges, Manchester, N. H., to Groisser & Shlager Iron Works, Somerville, Mass. (structurals), and Joseph T. Ryerson & Son Inc., Boston (reinforcing bars); Coleman Bros., Readville, Mass., general contractor.

STRUCTURAL STEEL PENDING

1250 tons, seven-span welded girder bridge, Bedford-Manchester, N. H.; also 430 tons of reinforcing bars and 230 tons of steel piles.

475 tons, state highway bridge, Fall River, Mass., Campanella & Cardi Construction Co., Hillsgrove, R. I., low on general contract.

350 tons, state bridges, including a three-span continuous beam bridge, Hopkinton, N. H.; bids Jan. 5 at Concord, N. H.

230 tons, two-span welded girder bridge, Middletown, Conn., bids Jan. 5 at Hartford,

Advertising Index

Abell-Howe Co. 435
Acheson Colloids Co., A Division of Acheson Industries, Inc. 259
Acme-Newport Steel Co. 438
Acme Steel Co., Acme Steel Products Division 470
Acme Welding Division of The United Tool & Die Co. 122
Acro Welder Mfg. Co. 402
Airaterra 258
Airline Welding & Engineering 455
Ajax Electric Motor Corporation 466
Ajax Engineering Corporation 305
Ajax Manufacturing Co., The 347
Alan Wood Steel Co. 241
Allegheny Ludlum Steel Corporation 62
Allied Chemical Corporation, General Chemical Division 197
Allied Research Products, Inc. 337
Allis-Chalmers 272, 273
Allmetal Screw Products Co., Inc. 453
Almco Queen Products Division, King-Seeley Corporation 46
American Air Filter Co., Inc. 67
American Brake Shoe Co., Electro-Alloys Division 335
American Gas Association 74
American Nickeloid Co. 257
American Optical Co., Safety Products Division 395
American Potash & Chemical Corporation, National Northern Division 417
American Pulverizer Co. 276
American Roller Die Corporation 420
American Schiess Corporation 135
American Steel & Wire Division, United States Steel Corporation 206, 207, 244, 245
American Steel Warehouse Association, Inc. .. 28
American Waldrich Mfg. Corporation 134
Arcos Corporation 372, 373
Armco Steel Corporation 92
Aronson Machine Co. 229
Atlantic Refining Co. 39
Atlas Car & Mfg. Co. 10

Babcock & Wilcox Co., The, Tubular Products Division ..... Inside Front Cover
Bailey, William M., Co. 107
Baird-Atomic, Inc. 283
Baker, J. E., Co., The 233
Baldwin-Lima-Hamilton Corporation, Hamilton Division 59
Barber-Coleman Co. 266, 267
Bay State Abrasive Products Co. 312, 313
Bearings, Inc. 261
Behr-Manning Co., A Division of Norton Co. .. 387
Bethlehem Steel Co. 1
Binks Manufacturing Co. 338
Birdsboro Steel Foundry & Machine Co. 433
Bishop, J., & Co. Platinum Works 253
Bliss, E. W., Co., Rolling Mill Division 35
Borg-Warner Corporation, Ingersoll Steel Division 117
Borg-Warner Industrial Cranes 19
Boston Gear Works 231
Branson Ultrasonic Corporation 16
Bridgeport Brass Co. 359
Brook Motor Corporation 308
Browning, Victor R., & Co., Inc. 203
Buell Engineering Co., Inc. 210
Buffalo Bolt Co. 308
Buffalo Forge Co. 385
Bullard Co., The 299
Byers, A. M., Co. 43

Cadman, A. W., Mfg. Co. 455
Cambridge Wire Cloth Co., The 271
Campbell, W. Ross, Co. 458
Carlson, G. O., Inc. 60, 61
Carpenter Steel Co., The 255
Carpenter Steel Co., The, Alloy Tube Division 382
Central Steel & Wire Co. 409
Chicago Steel Service Co. 353
Cincinnati Lathe & Tool Co. 388
Cincinnati Milling Machine Co., The, Meta-Dynamics Division 9
Cincinnati Shaper Co., The 37
Cleveland Crane & Engineering Co., The 76
Cleveland Metal Abrasive Co., The 66
Cleveland Punch & Shear Works Co., The .. 256
Cleveland Worm & Gear Co., The 284
Colorado Fuel & Iron Corporation, The 26, 27, 47
Columbia-Geneva Steel Division, United States Steel Corporation ..54, 55, 206, 207, 244, 245
Columbia-Southern Chemical Corporation ..342, 343
Commercial Shearing & Stamping Co. 2
Composite Forgings, Inc. 457
Continental Steel Corporation 260
Coolidge Corporation 123
Copperweld Steel Co., Ohio Seamless Tube Division 80
Copperweld Steel Co., Superior Steel Division 187
Crucible Steel Casting Co. 453
Cullen-Friestedt Co. 436
Cutler-Hammer, Inc. 124, 125

Damascus Tube Co. 389
Despatch Oven Co. 399
Detrex Chemical Industries, Inc. 432
Diamond Mfg. Co. 402
Dixie Bearings, Inc. 261
DoAll Co., The 137
Dodge Manufacturing Corporation 42
Dreis & Krump Manufacturing Co. 12
Du Pont, E. I., de Nemours & Co., Inc ..40, 41
Duraloy Co., The 230
Dwight Lloyd Division, McDowell Co., Inc. .. 269
Dykem Co., The 455

Eaton Manufacturing Co., Dynamatic Division 51
Electric Furnace Co., The 205
Electro-Alloys Division, American Brake Shoe Co. 335
Electro Metallurgical Co., A Division of Union Carbide Corporation 406, 407
Electronic Control Systems, Division of Stromberg-Carlson 393
Elwell-Parker Electric Co., The 7
Erie Forge & Steel Corporation 247
Erie Strayer Co. 444
Eureka Fire Brick Works 459
Ex-Cell-O Corporation, Machinery Division .. 213
Excelsior Leather Washer Mfg. Co. 444

Fafnir Bearing Co., The 188
Falk Corporation, The 57
Farquhar, A. B., Division, The Oliver Corporation 346
Farrel-Birmingham Co., Inc. 287
Fate-Root-Heath Co., The, Plymouth Locomotive Works Division 379
Federal-Mogul Division, Federal-Mogul-Bower Bearings, Inc. 423
Federal Products Corporation 339
Fellows Gear Shaper Co., The 306, 307
Filmsort Co., The, A Division of Miehle-Goss-Dexter, Inc. 403
Finkl, A., & Sons Co. 437
Firth Sterling, Inc. 249
Foote Bros. Gear & Machine Corporation .. 428
Formed Steel Tube Institute 367
Foster, L. B., Co. 468
Frasse, Peter A., & Co., Inc. 34

Gardner-Denver Co. 48
Garlock Packing Co., The 81
Gates Rubber Co., The 292, 293
Gear Specialties, Inc. 418, 419
General Chemical Division, Allied Chemical Corporation 197
General Motors Corporation, Hyatt Bearings Division 118
General Motors, New Departure Division 121
General Motors Corporation, Saginaw Steering Gear Division 58
Gerlinger Carrier Co. 17
Giddings & Lewis Machine Tool Co. ..320, 321
Gisholt Machine Co. 323
Gleason Works 131

Fast Delivery

Quality

SIMONDS
INDUSTRIAL
CUT GEARS

★ FINISHED GEARS
★ CUSTOM GEAR CUTTING
★ HEAT-TREATED, CASE OR FLAME-HARDENED

You are sure of quality and prompt service when you place your industrial cut gear requirements with SIMONDS GEAR. We produce the full range of sizes in the types and materials you need from your blanks or ours. Let us quote on your next gear requirements.

* * *

Stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

THE SIMONDS GEAR & MFG. CO.
LIBERTY at 25TH PITTSBURGH 22, PA.

Quality Gears for over 65 years

RAIL AND TRACK EQUIPMENT

You can get everything you need for industrial track and crane runways—with one call to your nearest Foster office. Immediate deliveries from the nation's largest warehouser of rails (both new and relaying), switch material, and track accessories. Send for free catalogs and ordering guides.

Complete Contractor Service—Since 1901

L. B. FOSTER Co.

PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
CHICAGO 4 • HOUSTON 2 • LOS ANGELES 5

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

Advertising Index

Globe Brick Co., The 421
Goodyear Tire & Rubber Co., Inc., The, Industrial Products Division 4
Gorton, George, Machine Co. 304
Great Lakes Carbon Corporation, Electrode Division 215
Greenlee Bros. & Co. 303

Hallden Machine Co., The 198
Hamilton Division, Baldwin-Lima-Hamilton Corporation 59
Hamilton Foundry & Machine Co., The 232
Handy & Harman 265
Harrington & King Perforating Co., Inc., The 212
Harshaw Chemical Co., The 368
Heresite & Chemical Co. 390
Hevi-Duty Electric Co. 350
Hill Acme Co., The 68
Hobart Bros. Co. 3
Holcroft & Co. 270
Hooker Chemical Corporation 44
Horsburgh & Scott Co., The 214
Houghton, E. F., & Co. 411
Hubbell, Harvey, Inc. 370
Hull, R. O., & Co., Inc. 431
Hyatt Bearings Division, General Motors Corporation 118
Hyde Park Foundry & Machine Co. 204

Indiana Steel & Wire Co., Inc. 457
Ingalls Iron Works Co., The 38
Ingersoll-Rand 277
Ingersoll Steel Division, Borg-Warner Corporation 117
International Nickel Co., Inc., The 86

Jones & Laughlin Steel Corporation, Stainless & Strip Division 45

Kaiser Engineers Division of Henry J. Kaiser Co. 403
Kearney & Trecker Corporation 315, 316, 317, 318
Keystone Lamp Manufacturing Corporation .. 466
Keystone Steel & Wire Co. 49
King-Seeley Corporation, Almco Queen Products Division 46
Kinnear Manufacturing Co., The 400

Laclede Steel Co. 327
Landis Machine Co. 14, 15
Leeds & Northrup Co. 405
Lewis Machine Co., The 457
Lindberg Industrial Corporation 64, 65
Linde Co., Division of Union Carbide Corporation 36
Link-Belt Co. 290, 377
Lodge & Shipley Co., The 77
Logan Co. 311
Logemann Brothers Co. 461
Loma Machine Mfg. Co., Inc. 434

McDowell Co., Inc., Dwight-Lloyd Division .. 269
McGill Manufacturing Co., Inc., Bearing Division 75
McKay Machine Co., The 345
McLouth Steel Corporation 85

Magnaflux Corporation 281
Malleable Castings Council 30, 31
Marathon Specialty Steels, Inc. 211
May-Fran Engineering, Inc. 326
Mesta Machine Co. 200, 201
Metal Treating Institute 275
Miehle-Goss-Dexter, Inc., The Filmsort Co. Division 403

TO FIND THE MAN YOU NEED...

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking

STEEL
The Metalworking Weekly

Advertising Index

Milford Rivet & Machine Co., The 370
Miller Electric Manufacturing Co., Inc. 282
Minneapolis-Honeywell Regulator Co. 25
Moltrup Steel Products Co. 455
Morgan Construction Co. 109
[illegible] Chain Co. 32, 33
Morse Twist Drill & Machine Co. 324, 325
Mueller Brass Co. 22
Mundt, Charles, & Sons 469

National Acme Co., The 300, 301
National Northern Division, American Potash & Chemical Corporation 417
National Steel Corporation 69
National Tube Division, United States Steel Corporation 54, 55, 206, 207
Neill, R. W., Co., Inc. 209
New Departure, Division of General Motors .. 121
Niagara Machine & Tool Works 332, 333
Northern Engineering Works 50
Norton Co., Behr-Manning Co. Division 387
Norton Co., Machine Division 296, 297

Ohio Crankshaft Co., The 29
Ohio Seamless Tube Division of Copperweld Steel Co. 80
Ohio Steel Foundry Co., The 128
Oliver Corporation, The, A. B. Farquhar Division 346
OPW Corporation 456
Osborn Manufacturing Co., The 357
Owen Bucket Co., The 453

Pacific Tube Co. 445
Pangborn Corporation 237
Parker Rust Proof Co. 112, 113
Peninsular Steel Co. 328
Pennsylvania Engineering Corporation 227
Perkins Machine & Gear Co. 291
Peterson Steels, Inc. 208
Philadelphia Gear Corporation 309
Pines Engineering Co., Inc. 82
Pittsburgh Engineering & Machine Division of Pittsburgh Steel Foundry Corporation 361
Plymouth Locomotive Works, Division of The Fate-Root-Heath Co. 379
Potter & Johnston Co. 72, 73
Pratt & Whitney Co., Inc. 70, 71
Production Machinery Corporation 351

Republic Steel Corporation 20, 21
Revere Copper & Brass, Inc. 224, 225
Roebling's, John A., Sons Corporation, A Subsidiary of The Colorado Fuel & Iron Corporation 47
Rogers Brothers Corporation 414
Rollway Bearing Co., Inc. 371
Rolock, Inc. 274
Royal McBee Corporation, Data Processing Division 115
Ruemelin Mfg. Co. 402
Ryerson, Joseph T., & Son, Inc. 127

Saginaw Steering Gear Division, General Motors Corporation 58
Sandvik Steel, Inc. 56
Sciaky Bros., Inc. 52
Scovill Manufacturing Co., Mill Products Division 221, 222
Sharon Steel Corporation 348, 349
Sheffield Corporation, The 310
Shepard Niles Crane & Hoist Corporation .. 322
Simonds Abrasive Co. 381
Simonds Gear & Mfg. Co., The 467
Simonds Saw & Steel Co. 331
Sonken-Galamba Corporation 466
Stamco, Inc. 415
Standard Pressed Steel Co., Unbrako Socket Screw Division 132
Standard Screw Co. 8
Sterling National Industries, Inc. 212
Stromberg-Carlson, Electronic Control Systems Division 393
Sun Oil Co., Industrial Products Department 11
Sun Ship Building & Dry Dock Co. 425
Superior Steel Division of Copperweld Steel Co. 187
Surface Combustion Corporation 78, 79
Sutton Engineering Co 352

Taylor, S. G., Co., Inc. 292
Tennessee Coal & Iron Division, United States Steel Corporation 206, 207, 244, 245
Textron, Inc., The Waterbury Farrell Foundry & Machine Co. Division 195
Thomas Flexible Coupling Co. 430
Thomson, Judson L., Mfg. Co. 365
Timken Roller Bearing Co., The 251
Timken Roller Bearing Co., The, Steel & Tube Division 138
Tomkins-Johnson Co., The 254
Torrington Co., The 91
Towmotor Corporation 17
Townsend Co. 429
Tube Distributors Co., Inc. 440

Udylite Corporation, The 63
Union Carbide Corporation, Electro Metallurgical Division 406, 407
Union Carbide Corporation, Linde Division .. 36
Union Wire Rope Corporation 24
United Engineering & Foundry Co. 289
United States Drill Head Co. 23
United States Steel Corporation, Subsidiaries 54, 55, 206, 207, 244, 245
United States Steel Export Co. 54, 55, 206, 207, 244, 245
United States Steel Supply Division, United States Steel Corporation 54, 55, 206, 207
United Tool & Die Co., The, Acme Welding Division 122

Valley Mould & Iron Corporation 111
Vanadium Corporation of America 463
Vaughn Machinery Co., The 397
Veeder-Root, Inc. 426
Verson Allsteel Press Co. 18
Virginia Gear & Machine Corporation 309

Wales Strippit, Inc. 404
Walsh Refractories Corporation 6
Ward Steel Co. 403
Washington Steel Corporation 443
Waterbury Farrell Foundry & Machine Co., The, Division of Textron, Inc. 195
Wean Engineering Co., Inc., The .....Back Cover
Webb Corporation, The 442
Weirton Steel Co. 69
Westinghouse Electric Corporation 218, 219
Wheelock, Lovejoy & Co., Inc. 314
Wheland Co., The 468
Whitehead Metals, Inc. 465
Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corporation 26, 27
Wilson, Lee, Engineering Co., Inc. .....Inside Back Cover
Wisconsin Motor Corporation 239
Wrought Washer Mfg. Co. 94
Wycoff Steel Co. 319

Yoder Co., The 412
Youngstown Foundry & Machine Co., The .. 53
Youngstown Sheet & Tube Co., The 13

Table of Contents, Page 5

Classified Advertising, Page 466

MUNDT

PERFORATED

METAL

MEANS

PERFECT

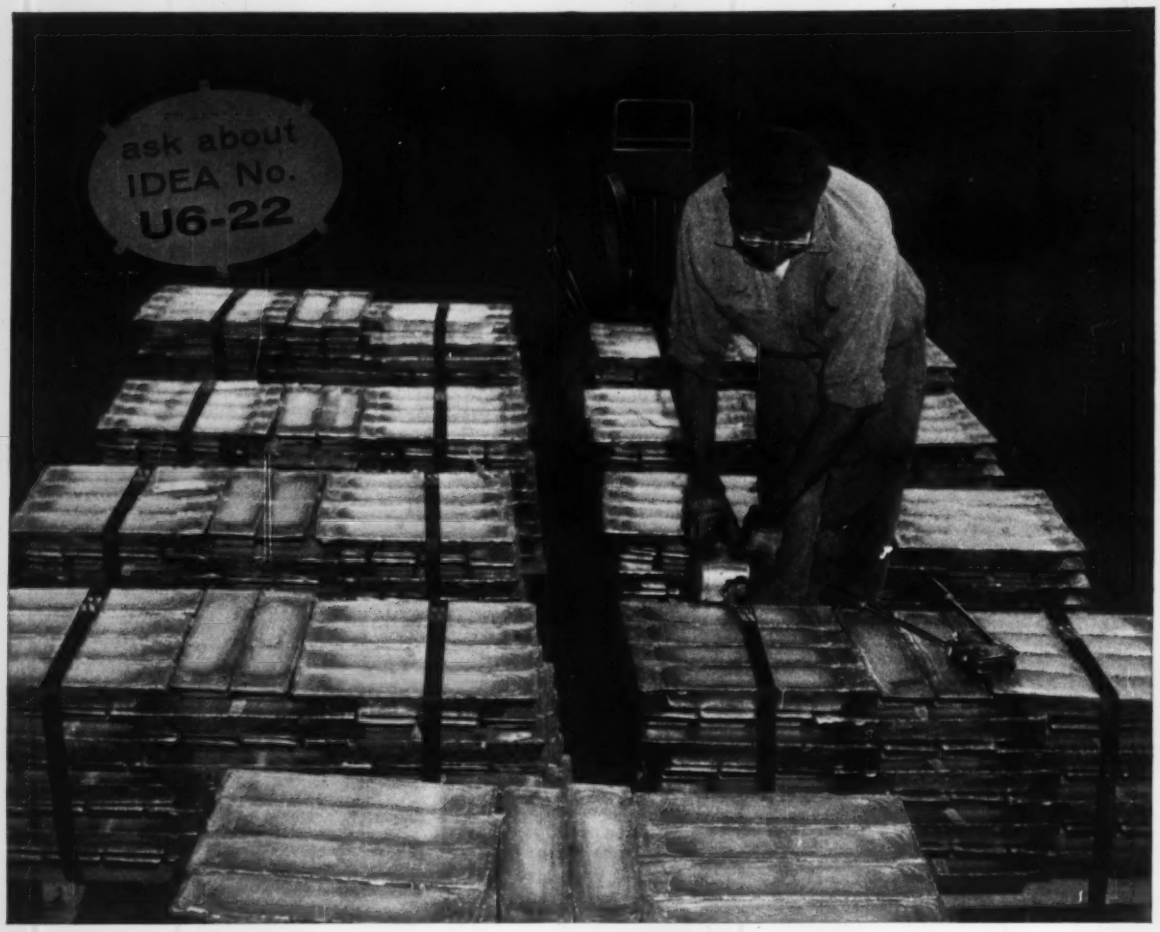
SCREENS

Specially Fabricated for ALL INDUSTRIES BY

CHARLES MUNDT & SONS

53 FAIRMOUNT AVE.
JERSEY CITY 4, N. J.
PHONE—DELAWARE 3-6200

Send for Illustrated Catalog



Work with your AIM* . . . Federated Metals does . . .

Steel strapping cuts ingot loading time in half

FEDERATED METALS Division of American Smelting and Refining Company, Whiting, Ind., was looking for ways to speed handling and unloading of non-ferrous alloys. Their Acme Idea Man suggested a method using heavy-duty Acme Steel Strapping (Idea No. U6-22).

Acme Idea Man Andy Bassi assists Federated Metals and many other companies with their packaging and materials handling problems.

Now ingots are strapped to skids and these units are loaded into box cars and trucks with lift trucks. Formerly, the ingots were loaded loose on skids brought to the cars and stacked by hand. The new method cuts loading time by 50%, and customers report unloading costs are reduced by as much as 75%!

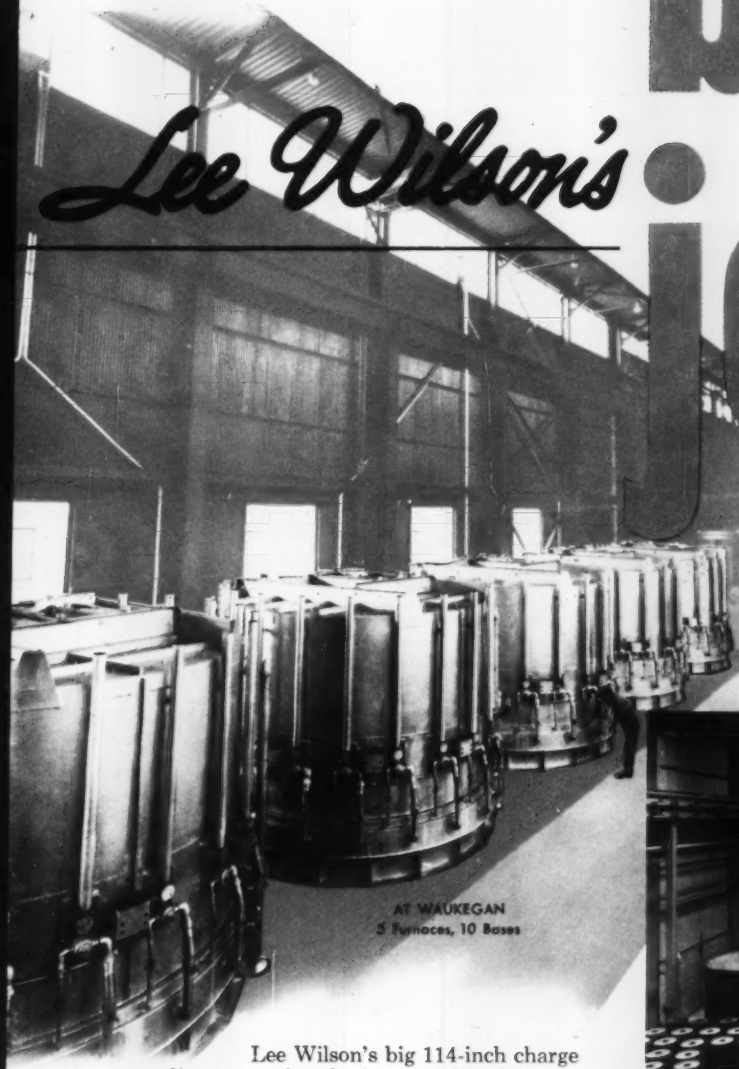
Unitizing ingots enables Federated Metals to double and triple storage capacity, too, because the units can be stacked for maximum utility of warehouse space.

***Work with your Acme Idea Man** to improve your materials handling from a time and money-saving standpoint, as well as for increased product protection. Write Dept.SDU-19, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL STEEL STRAPPING

Lee Wilson's 'big jobs'...

give American Steel and Wire greater productivity, better Rods and Wire



AT WAUKEGAN
5 Furnaces, 10 Bases

AT CUYAHOGA WORKS 6 Furnaces, 12 Bases

Lee Wilson's big 114-inch charge diameter rod and wire annealing furnaces give American Steel and Wire both the speed and quality they require to meet modern-day competition.

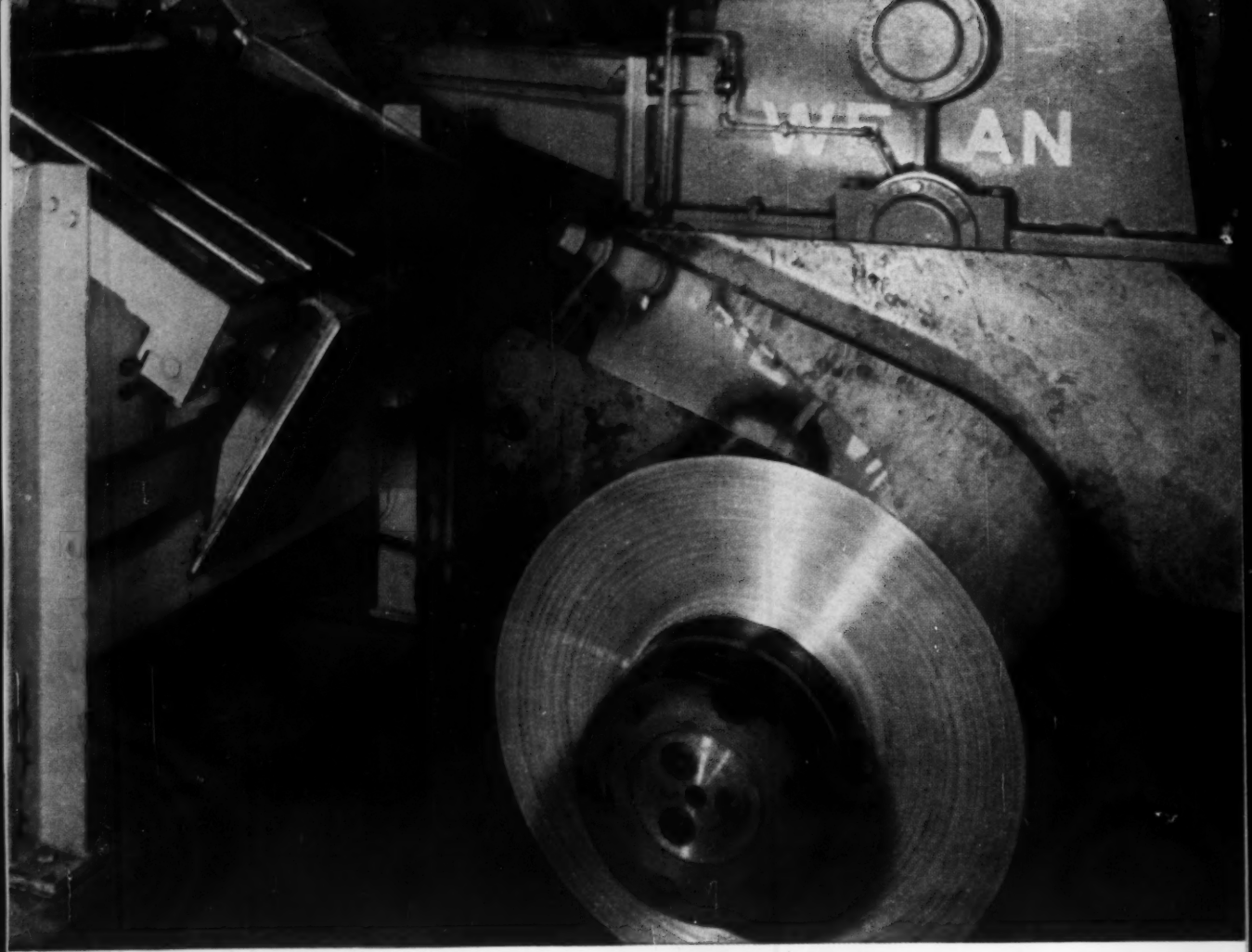
The largest furnaces of their type ever built, they will easily take four spiders of heavy rod in a single charge. A high convection system that sends 5 million BTU's per hour is controlled with exacting precision from a central control area.

If you're considering investing in new wire annealing equipment, make certain you check first with Lee Wilson—America's most experienced wire and rod annealing equipment manufacturer.

Lee Wilson* ENGINEERING COMPANY, INC.
20005 LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES.
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES



End product of tinning line leadership . . .

Wean designed and built the first full-width commercial electrolytic tinning line, and has been the leader in all significant technological advances made in this field. More than three-fourths of this country's tin plate is produced on Wean lines.

This is but one example of the partnership between Wean and the steel industry in the development of improved sheet, strip and tin plate processing techniques.

THE WEAN ENGINEERING COMPANY, INC. • WARREN • OHIO

WEAN